

Lecture Notes in Bioengineering

Enrique Moguel
Lara Guedes de Pinho
César Fonseca *Editors*

Gerontechnology

V

Contributions to the Fifth International
Workshop on Gerontechnology,
IWoG 2022, November 17–18, 2022,
Évora, Portugal, and Cáceres, Spain

 Springer

Lecture Notes in Bioengineering

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Preface

The International Workshop on Gerontechnology (IWoG) aims to promote research and scientific exchange related to Gerontechnology and to bring together researchers and practitioners from various disciplines of the academia, public administrations and industry in order to tackle emerging challenges in the Gerontechnology applications and associated technologies, as well as to assess the impact of these technologies on society, media and culture.

This volume collects the full research papers (field, statistics, technical and vision works) and short research papers presented at the Fifth International Workshop on Gerontechnology (5th IWoG), held in Évora (University of Évora, Portugal) and in Cáceres (University of Extremadura, Spain) during November 17–18, 2022.

The Fifth edition of IWoG accepted contributions related to different dimensions of Gerontechnology: use of technology to improve functional ability and promote healthy aging; health interventions to support caregivers of elderly people; the effectiveness of public health initiatives and clinical interventions for prevent, reverse or mitigate decreases in physical and mental abilities; solutions for active aging, social integration and self-care; monitoring and management of chronic and non-chronic diseases in ambient assisted living; learning, training and coaching systems to promote healthy life in ambient assisted living environments; smart homes and sensor networks for ambient assisted living; context awareness in ambient assisted living environments; use of context and location information in user interfaces; elderly nutrition; health, wellness and disease monitoring; knowledge management for health (context, cognition, behavior and user modeling); health ecosystems (frameworks, models and methodologies); smart technologies and algorithms for health.

This workshop was organized by the program committee (PC), with a senior PC composed of well-known experts from the field in charge of monitoring the work and animating the discussions of the broader regular PC. This made it easier to run the virtual PC meeting of the full research papers track and the discussion about each paper.

The program for IWoG 2022 was versatile and multifaceted. In this workshop, there were only full papers, and we selected 40 out of 93 submissions, resulting in an acceptance rate of 43%.

This excellent and comprehensive program would not have been possible without the help of those who contributed to the success of the event. We would like to thank all the different chairs for their hard work.

We are grateful to our local organizers 4IE team of University of Extremadura and University of Évora for their logistical support and to Springer for publishing this volume. In addition, we want to thank the PC members, the additional reviewers and the student volunteers for their effort to make IWoG 2022 a very special event, both in terms of academic ambition and practical arrangements.

Finally, we want to thank you, authors and the IWoG community, for taking the time and effort to participate in IWog 2022.

January 2023

Enrique Moguel
Lara Guedes de Pinho
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Smarts Technologies and Algorithms for Health



Case Study on the Moving of Patients Using Blockchains' Federation

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Abstract. He patients moving between medical institutions is a process that takes place on a daily basis, either to continue or improve their treatment. At each moment of the moving (origin hospital, means of transport and destination hospital) information is generated in isolation, which is recorded in each of the health information systems. This limits the interoperability needed to provide quality services to the patient. Also, it is not possible to have the trajectory of the information when a patient is moved, generating problems in medical decision making, since only a small vision of the actors in each system is available. In this paper, a case study of patients moving between medical institutions is presented, applying the FedBlocks tool, which uses the concept of Blockchain federation, where a higher order Blockchain is in charge of federating a set of lower level Blockchains, generating a view of the patient's entire medical history. Likewise, all interconnected systems communicate and can share authorized data of their patients, providing a benefit for these systems and for the actors of the entire ecosystem.

Keywords: Blockchains federation · Health · Interoperability · Patients moving

1 Introduction

The large healthcare ecosystem includes several interconnected stakeholders with different and sometimes conflicting needs. The healthcare environment involves a high degree of information exchange among the actors involved, however, this information is highly fragmented and distributed in multiple non-integrated Health Information Systems (HIS), making it impossible to have adequate availability of information to support the care process and decision making [1]. Achieving an appropriate continuity of care requires a permanent flow of such

J. Rojo—These authors contributed equally to this work.

information. A fundamental aspect to achieve this objective is to achieve interoperability between the information systems that support the care processes [2].

Patient transfer (in Colombia called patient referral [3]) is the process by which a patient is transferred from a lower level health institution to a higher level institution, either to improve diagnosis or treatment, or because the institution of origin does not have the technological or financial resources to offer quality health services. In this process, information is generated in the sending organization (e.g., taking vital signs, taking tests, among others). During the transfer (trip), the patient may need to be stabilized or treated, generating important data for the destination institution. When the patient arrives at his destination, it is necessary to record information on his condition and continue with his treatment and diagnosis. All this information is currently recorded in isolation in different SIS.

However, advances in telecommunications and Internet coverage have managed to reduce this gap, achieving mobile connections and generating platforms for constant information management. Likewise, it is possible to record data from mobile devices, which guarantees constant monitoring of patient data, but at the same time generates possible security gaps in the SIS. The European Commission has recently filled this security gap by specifying in the Guidelines on a medical device vigilance system [4] cybersecurity controls and requirements to ensure the safety of medical devices and maintain an adequate level of device functionality and security. In addition, Lin et al. [5] suggest that the implementation of health-oriented technology is linked to decreased morbidity and mortality.

Among the technological solutions proposed to solve the problems mentioned above is Blockchain (BC). This disruptive technology has some characteristics that make it ideal for supporting the entire healthcare ecosystem. A BC is, a data structure consisting of an ordered sequence of batch entries, called blocks. The order of these blocks is established by storing in its header a timestamp and a cryptographic hash of the immediately preceding record within each block. The use of the hash serves to verify the integrity of the previous block, and gives rise to the key emergent property of the BC as a data store: immutability. Any attempt to alter the data in an established block is easily detected, as it changes the hash of the altered block and, consequently, the hashes of all subsequent blocks in the chain. Also, the timestamp allows for traceability of all data on the chain.

A CB is maintained by a set of nodes (peers), which store a copy of the entire chain. Nodes are entities without a pre-existing trust relationship that are connected through a peer-to-peer (P2P) network. In this network, entities (e.g., servers) participate in a completely decentralized manner. That is, it is a network where there is no central point of connection or control, and where the parties act autonomously, responding to a common communications protocol and consensus.

Although BC solves many of the drawbacks, it is difficult to think of a single BC being able to manage the whole ecosystem. In this sense, some concepts have been generated lately that use the combination of several BCs, for example, the Blockchain concept of Blockchain's BoB [6]. The BoB is a blockchain tree

structure. A hierarchy of blockchains manages the security, trust and heterogeneity issues between private blockchain communications. Another novel solution is Blockchain federation [7,8], where a higher order Blockchain is tasked with federating a set of lower level Blockchains, generating a view of the patient's entire medical history. Also, all interconnected systems communicate and can share authorized data of their patients, providing a benefit for these systems and for the actors of the whole ecosystem themselves.

In the literature, we have not found any studies related to patient transfer that address technological alternatives that cover it.

In this paper we analyze the concept of Blockchain Federation' within the case study of patient transfer between medical institutions, with the purpose of evidencing some advantages of using this concept.

The document is organized as follows: Sect. 1 discusses some work related to patient transfer. The BC Federation concept is described in Sect. 2. Then, in Sect. 3, the case study is described, comparing how patient transfer is currently done versus how it would be done with the BC Federation concept. Finally, Sect. 4 discusses conclusions and future work.

2 Description of BC Federation

The architecture proposed, showed in Fig. 2, revolves around adding software components on top of existing information systems, without the need for services or institutions to replace their existing solutions. The term "blockchain federation" describes the linking of numerous lower-level blockchains (patients' blockchains) with a top-level blockchain (main blockchain), which is in responsible of nesting them and granting access to all lower-level blockchains.

The blockchains belonging to the patients are in charge of conserving the data inside the network. Each patient's blockchain is independent of the federation and may be used as a stand-alone data structure. The fact that each of these blockchains holds the data for a single patient is the key to the blockchains' federation idea.

Each patient must have a single blockchain to prevent several incomplete copies of their information from being in various organizations. The simplest method to do all of this is to establish a structure that shows where each existing patient's blockchain is situated. All institutions and services must adhere to this framework.

This routing system is used in the federation of blockchains by another blockchain, the main blockchain. The location of a patient's blockchain is stored in each block of this blockchain, together with the details required to identify the patient to whom it belongs. Every institution has a node on the primary blockchain, allowing it to keep track of any changes to the patients or the location of their blockchains.

In [7], Rojo et al. explain the concept of blockchains' federation more deeply, as well as propose an architecture over this concept to integrate distributed health data of patients. Rojo et al. have proposed also the use of this concept to enable the integration of actor-based data in [8].

3 Methodology and Case Study

The patients moving between medical institutions is a formal process, formally regulated in most countries. In Spain, the moving of patients in medical vehicles by road is regulated on the basis of Royal Decree 836/2012 of the Ministry of the Presidency [9]. In Colombia, the procedure is formally referred to as “Patient referral and counter-referral”, and is regulated by the political constitution of Colombia [10] and several complementary articles, such as decree 4747 of December 2007. REFERRAL is understood as the sending of patients by a health service provider to another provider for care or diagnostic complementation; it considers the level of resolution and is carried out in order to respond to health needs. COUNTERREFERRAL is the response that the health care provider receiving the referral gives to the referring provider. The response may be the counter-referral of the patient with the appropriate instructions to follow or simply the information on the care provided to the patient in the receiving institution, or the result of the requests for diagnostic assistance.

Next, and to summarize the process, a description of the patient referral process is made, as it is currently performed, without having the BC support. Subsequently, the description is made by applying the BC Federation concept. The above using the guidelines dictated by the Instituto Departamental de Salud de Nariño Colombia [3].

3.1 Actual Patients Moving

Currently, when a patient transfer process is required, the following three moments take place:

3.1.1 1. Source Health Institution

SHI in Fig. 1. All information generated in this process is recorded in the SHI’s SIS:

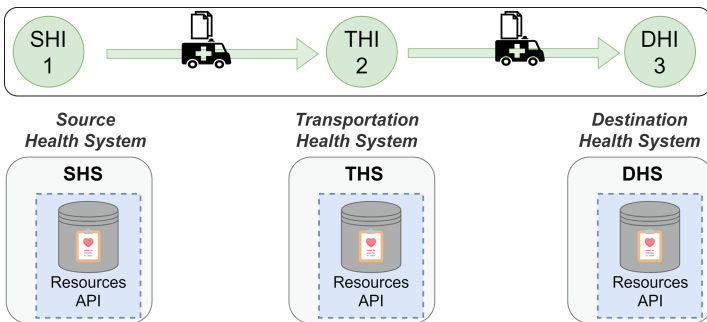


Fig. 1. Architecture of the Patient Transfer process at present.

- The origin institution, in the place where the patient is admitted, for example, the emergency room, the process of recording general data is performed, regardless of the patient's condition.
- Subsequently, the TRIAGE is performed, which is a system for selecting and classifying patients in the emergency department. Personal data, vital signs (blood pressure, heart rate, respiratory rate, temperature, pulse oximetry, weight, height, among others) are recorded.
- Depending on the TRIAGE result, the patient is classified on a scale ranging from TRIAGE 1 for patients requiring immediate attention, to TRIAGE 5 patients requiring outpatient care in the next 72 h.
- If the originating institution does not have the technical or operational resources, the decision is made to transfer the patient to a health institution with a higher level of care, this is done through a transportation network managed by a Transportation Health Instruction.

3.1.2 2. Transportation Health Institution

THI in Fig. 1. All information generated in this process is recorded in THI's SIS.

- This process can be managed by the same institution of origin, or by a third institution (THI in Fig. 1) that is in charge of the necessary logistics and of recording all the information generated in this process.
- Along with the patient, health personnel (e.g., doctors or nurses) travel with the patient, depending on the complexity of the patient. These personnel record information on possible procedures that may be needed, such as taking vital signs or, if necessary, more complex processes such as resuscitation.
- In some cases, in order to monitor the patient's state of health, they have devices connected to their body that remotely record information (e.g., vital signs) in the THI's SIS.

3.1.3 3. Destination Health Institution

DHI in Fig. 1. All the information generated in this process is recorded in the DHI's SIS:

- When the patient arrives at the DHI, the TRIAGE is repeated, again recording the personal data and vital signs mentioned above.
- The receiving physician performs the TRIAGE classification again and accepts the patient.
- Depending on the severity, the necessary medical procedures are performed to improve the patient's health condition.

As can be seen, information is generated at each step of the process, which is isolated in each Health System. This means that the entire history of the process is not available and only a reduced vision is available for decision making towards the patient.

There is a Standardized Patient Referral Form (Resolution 4331 of 2012), which must be filled out in each of these processes. Each health institution must report monthly to the regulatory institution, through a report indicating each and every one of the cases that were carried out with respect to the referral of patients, in order to follow up and analyze the information and make decisions.

3.2 Patients Moving Using BC Federation

The same three moments are also developed, and in the same sequential order. Next, the differences that existed in each process are mentioned, now using the concept of Blockchain Federation.

3.2.1 1. Source Health Institution

SHI in Fig. 2. The data generated since the patient arrives at the originating institution is securely recorded with the help of APIs within the SIS of each institution, in this case in the SHI. To make it accessible, each time patient information is registered or modified, a new block is created in the patient's PBC, which contains the information where the API exposes the resources and the information to access them. To enable interoperability and data integration between different healthcare institutions, each MBC block includes the location of the PBC implementation and how it can be accessed. Each patient has a single BC, and which SIS implements the PBC should be decided by common criteria between organizations, which is an easier agreement to reach than the use of shared information systems.

3.2.2 2. Transportation Health Institution and 3. Destination Health Institution

THI and DHI in Fig. 2. In these two moments, the same procedure described immediately above is performed, except that the data are first recorded in the institution's SIS of THI and DHI, which can be accessed from the MBC by the reference they have for each of the PBCs.

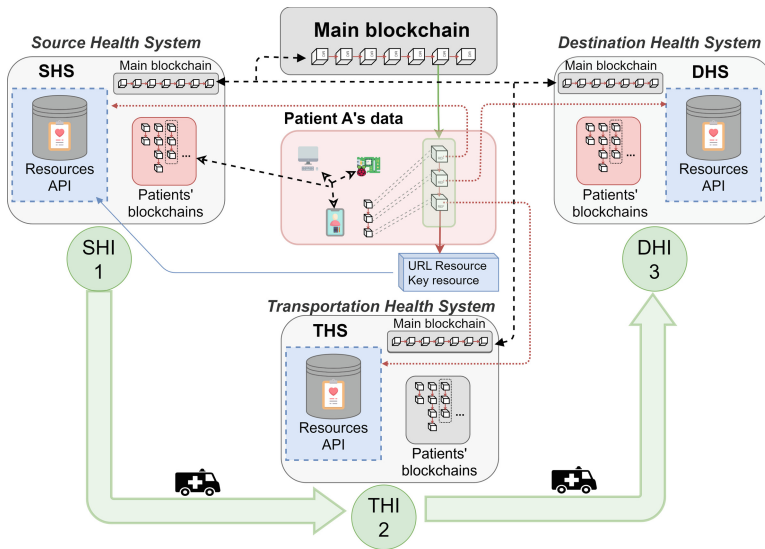


Fig. 2. Architecture of the Patient Transfer process applying the Blockchain Federation concept.

4 Conclusions and Future Work

In this paper, we have conducted a case study concerning the transfer of patients between different health institutions. We have analyzed, compared and discussed the scenario of how the transfer of patients is currently performed and how it would be performed with the blockchains federation concept. In the first, it became evident that the information generated in each process (source, transportation and destination) is recorded in isolation, which means that the medical staff does not have all the medical history to make decisions for the patient, in addition, the patient would have dispersed and in some cases duplicated information, which generates multiple logistical and health problems. In the second, taking into account the FBC, multiple improvements in the process are evident. First, the patient has control of his or her entire medical history, and health personnel have a complete picture of the patient's health status, which will be reflected in better decisions for patients.

With the addition of FBC, the patient transfer model changes. Now all members of the patient transfer ecosystem record their transactions in each HI's SIS, allowing for greater transaction security. In addition, all the information in the patient's medical record can be stored in a decentralized manner and accessed jointly by both healthcare personnel and patients. In this way, all the actors in the healthcare ecosystem can have interoperability in the information, although in reality it is distributed in the health information systems of each medical institution.

As future steps of this case study, the analysis and subsequent implementation of the ecosystem shown in the real world and with institutions in the health sector will be carried out. The purpose of this is to carry out a complete validation and take metrics, in order to scale the number of actors and transactions. This will allow adjustments to be made to the proposal and add valuable evidence for future research and implementation.

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Communication in Isolated Rural Areas: A Comprehensive Review of the Alternatives to the Internet

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Abstract. Access to the Internet has become a great disruption in society. The possibilities of communication and real-time transmissions have opened a great social, economic and cultural disruption. However, at the same time, these advances have driven a division between the communities which are able to connect to the Internet and those that are not able. This is the concrete case of isolated rural areas, where social, geographical and demographic factors become obstacles to the deployment of communication infrastructures. As a response to this, there are works which aim to provide communication in isolated regions. In this paper, a comprehensive review of the alternatives to the Internet infrastructure is proposed. For this, a taxonomy of two main groups is applied to classify solutions: works which make use of their own infrastructure and works which provide a connection over infrastructures already deployed. Thus, proposals such as opportunistic networks, satellite Internet, 4G coverage, long-range technologies, and Internet over power lines or TV signals are detailed. Hence, their main characteristics and limitations are studied. As a result, the discussion shows that there is not the global best alternative, however, opportunistic networks raise as the most interoperable.

Keywords: Communication solutions · Digital gap · Internet access · Opportunistic networks · Delay tolerant networks · Infrastructure-less technologies

1 Introduction

Internet access in rural areas has motivated a large number of research lines and works over the last decades [1–3]. The Internet has experienced a massive deployment in societies all over the world. However, these advances have generated, at the same time, great differences between the connected places and those which lack Internet. This phenomenon is known as the digital gap [4], a concept which illustrates the line which separates people, homes and businesses from the digitalization possibilities.

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The digital gap has been widely studied from a scientific point of view [4]. Some of these contributions identify this situation as the consequence of two main variables [5]: income and education. Nevertheless, the profile of people who face this problem has evolved over the years. The decrease in the costs of the devices and Internet rates have driven people to be able to connect to the network [6]. As a consequence, moderated democratisation has been achieved. However, the digital gap is still evident in those rural areas and regions which lack the infrastructure required to access the Internet.

Some isolated rural areas, even located in developed countries, face limitations to accessing or hiring Internet [4]. Limitations such as the geographic conditions or the demographic and social factors become obstacles to the deployment of the required infrastructure [7]. Internet is mainly based on TCP/IP protocol [8], a mechanism which requires favourable conditions to provide communication. Hence, the protocol is not applicable to certain contexts. As a response to these situations, there are alternatives which aim to provide services to palliate disconnection.

In this paper, a comprehensive review of the alternatives to provide connection in rural areas is proposed. Thus, the problems around the digital gap are addressed, studying the core of the works which aims to palliate its effects. For this, the manuscript is organised as follows: firstly, section two analyses the main obstacles which intervene in the digital gap. Then, section three reviews the most relevant proposals to provide Internet access in rural areas, studying their possibilities and main limitations. Also, a discussion is raised about the different alternatives. At last, section four draws some conclusions about the works.

2 Internet in Isolated Rural Areas

Internet requires the deployment of communication infrastructures which enables the application of the protocols involved in data transmission. These technologies are based on a network of nodes which are connected to achieve communication between ends [9]. The way that the nodes communicate has evolved over the years. Right now, optical fibre consolidates the most solid mechanism, enabling a great bandwidth to multiple simultaneous connections [10]. This evolution has motivated emerging applications which are used daily, such as streaming flows or real-time transmission. However, the demanding requirements of this infrastructure are not always applicable to certain contexts. This is the case of isolated rural areas [4].

Isolated rural areas use to find a set of common characteristics [11]. A recurrent case, which use to apply to a large set of locations, is the context of small villages, generally located in isolated spots, with geographical features such as great mountains, valleys, huge lakes or massive plains. These places use to count with poor physical connections such as small roads and lack of a solid public transportation system. From the point of view of the demography, these rural areas use to count with a reduced population, generally integrated by older adult

inhabitants, with advanced average age and a reduced percentage of young people [12]. These elements on balance raise the locations as not relevant for the telecommunication companies.

Telecommunications are founded by private companies and generally supported by governments. However, considering the high costs of installing and deploying the required devices and infrastructure, some regions do not become interesting from the economical point of view [13]. The low return advocated by the reduced number of potential clients and the difficulties to face the local geographic limitations become great obstacles to digitisation. As a response to this context, there are proposals which aim to provide Internet access and data transmissions without requiring high investment. The next section proposes a taxonomy of these alternatives and analyses their characteristics and challenges.

3 Communication Alternatives to Provide Internet Access in Rural Areas

There are proposals which aim to provide Internet access and data transfers in contexts where optical fibre or Internet protocols are not applicable. The research literature provides a rich ensemble of solutions which make use of alternative resources to provide communication between ends. In this paper, some of the most relevant techniques are considered. For this, a taxonomy which identifies two groups is proposed: on the one hand, applications which imply the use of additional resources to achieve communication; and, on the other hand, techniques which work over resources already deployed. Next, these advances are detailed.

3.1 Solutions Which Require the Deployment of New Infrastructure

There are alternatives to the Internet which require the deployment of infrastructures to communicate ends. This is the case of the Celular 4G Coverage, the satellite Internet, the balloon mesh network, long-range technologies and Delay Tolerant Networks (DTN). Next, these proposals are described.

3.1.1 Cellular 4G Coverage

This proposal becomes one of the most widespread communication architectures. 4G connection enables the use of Internet-based cellular communication [14]. For this, a network of phone towers is locally distributed, providing coverage to access to high-speed Internet. The access to the network is linked to a Subscriber Identity Module (SIM) card and an active subscription to the services. Thus, the connection to the Internet can take place using a compatible mobile device such as a smartphone, tablet or laptop; or using a 4G router. As a result, the connection rates of this technology are highly practicable in multiple contexts, including rural areas. Its widespread presence has consolidated a significant disruption against the digital divide [6]. However, the cellular mobile network still faces challenges in certain scenarios.

The use of cellular networks requires a high density of infrastructure to provide a large coverage area [14]. This condition implies a high investment for the installation of cellular towers, which can become insufficient for areas with concrete geographical conditions such as valleys, mountains or deep forests. Also, it is required that the user keeps subscribed to the services which sometimes become expensive. As a result, the application of 4G communications depends actively on the investment from companies, government and users, factors which become negative for rural areas with low population density, difficult physical access or low income [13]. Therefore, it becomes relevant to explore further alternatives and communication technologies which provide similar performance at a lower cost.

3.1.2 Satellite Internet

The satellite Internet proposes the application of orbit satellites to provide Internet connection in remote areas [15]. Considering the physical barriers and geographic conditions which disable the deployment of stable nodes in isolated areas, this proposal aims to communicate remote ends using satellites as intermediate elements. This way, it is possible to establish communication between points separated by large distances. For this, satellites work as a mirror for communication, serving as a fixed intermediate node which links the sender and receiver.

This solution has been deeply explored over the years, with latency as a great obstacle to providing fast Internet [16]. The large distances involved in the communication processes become the main reason for this latency. However, in recent years, research in the field has become in vogue. Thus, relevant improvements have been achieved, establishing low-latency Internet connections [16]. Nevertheless, the proposal implies a great investment, involving the positioning of satellites and the maintenance of large-scale infrastructure. These points motivate enterprises to offer services with high subscription costs and charges based on use. As a result, Internet satellites become an expensive alternative which finds its main obstacle in the significant operative costs.

3.1.3 Balloon Mesh Network

This solution aims to provide Internet connection in areas where communication infrastructures are not applicable [17]. For this, the proposal is based on the use of stationary balloons deployed in the troposphere, around twenty kilometres at altitude. This way, the balloons shape a mesh network which serves as intermediate elements between a gateway antenna, that is connected to the Internet, and the devices located in the ground. Based on this model, devices and homes located in shadow areas are able to receive and transmit information.

Some proposals have applied this methodology to provide 4G connection [17], achieving great results. The latest advances in the discipline have positioned balloon mesh networks as a reliable option to provide an Internet connection. However, there are relevant flaws derived from the operability of the architecture which is difficult to tackle.

A balloon mesh network requires a great investment to achieve a stable architecture. In the same way, the costs of operation are high and the maintenance requires efforts to keep the network operable [18]. Also, the physical exposure of the mesh to the weather and climatic events becomes a potential risk to the stability of the network [19]. In spite of the proposal having manifested good performance at providing an extensive coverage area, the geographic characteristics can become obstacles to the transmissions, especially in valleys, mountains and forest regions.

During the last few years, the introduced model of balloons has led to the application of alternative devices to serve as intermediate nodes. This is the case of drones [20], which can be deployed in lower altitudes. However, they face similar issues in deployment and maintenance.

3.1.4 Long Range Technologies

The requirements of transmitting information between ends have been widely addressed even before the Internet era. This is a concrete case of long-range technologies based on radio frequencies. These solutions provide communication by making use of sender and receiver antennas, enabling transmissions over long distances. Based on this philosophy, there are multiple protocols and specifications. Some of the most popular are Long Range Wide Area Network (LoRaWAN), Symphony Link and ZigBee.

LoRaWAN [21] and Symphony Link [22] are specifications for networks based on LoRa modulation [23]. In the case of ZigBee, it makes use of IEEE 802.15.4, specification focused on Wireless Personal Area Network (WPAN) [24]. These technologies provide communication between ends and can be practicable to provide Internet access. For this, making use of a gateway connected to the network, they can serve as the link to a set of devices located in the coverage area. Currently, there are commercial proposals such as SigFox [25] or Z-Wave [26] which apply this architecture to provide communication to devices. Nevertheless, there are concrete limitations to applying these solutions as an Internet bridge.

LoRaWAN, Symphony and ZigBee are not implementations focused on providing Internet to final users. Instead, these solutions aim to communicate Internet of Things (IoT) devices following a Machine-to-Machine (M2M) logic [23]. As a consequence, the implementation of these services does not quite fit with Internet requirements. This is concretely appreciable in the fragmentation process of the packets. Radio frequencies apply a packet size smaller than TCP/IP, aiming to optimise the communication from sensors and the transmission of registered values [18]. This way, long-range technologies find concrete limitations to provide data transference for isolated rural areas. However, they become a suitable resource for contexts where high latency is not mandatory. This is the case of Delay Tolerant Networks.

3.1.5 Delay Tolerant Networks

DTN defines a discipline focused on providing data transmission between devices in contexts where latency is high [18]. In this scenario, communication faces

recurrent interruptions and periods of disconnection. Hence, the Internet is not applicable. With the aim of providing a response in these circumstances, DTN proposes a communication method in which the network is shaped by nodes which are able to store and keep the information while transmissions toward the destination are not possible.

DTN is applicable to multiple technologies and communication interfaces. The transmission model proposed by these solutions is compatible with a set of communication technologies, such as low or long-range interfaces [18]. Therefore, it is possible to implement heterogeneous networks and adapt the infrastructure to the characteristics of the context.

One of the most common models in DTN is the one based on moving nodes. This way, the network can be shaped by devices which carry information and forward it to others when they encounter it. This model is known as an opportunistic network and become a potential implementation to provide communication in rural areas without requiring great investment [27]. Thus, devices can act as intermediate nodes toward the destination gateway. There are proposals [27–32] that explore applications and the sustainable operability of opportunistic networks in isolated rural areas. In these works, the deployment of solutions based on DTN is studied, reaching favourable latency values and significant delivery rates. As a result, DTN becomes a potential communication technique to provide data transmission in remote areas, requiring low investment and enabling dynamic topologies that adapt to the features of the region.

3.2 Solutions Which Work over Infrastructures Already Deployed

There are proposals which aim to provide Internet connection in rural areas using networks and contextual resources deployed in the context. This is the case of initiatives such as the Internet over telephone networks, over power lines or using television white spaces. In this section, the main characteristics and challenges of each service are studied.

3.2.1 Internet over Telephone Network

The telephone network is an infrastructure largely extended in countries, including rural areas. For decades, the exploitation of the voice channel to transmit information has been studied by telecommunication companies, aiming to provide Internet access using the telephone network [18]. Thus, some companies still offer these rates in concrete regions where the Internet is not available [18].

Internet over telephone network uses a modem connected to a computer to simulate dialling actions. Thus, dialling instructions are transmitted through the telephone voice network and then received and interpreted by a modem and a node which is connected to the Internet. As a result, it is possible to provide a connection using the deployed infrastructure. In spite of these services are still available for certain regions, these rates face a significant limitation in the transmission speed, with significant and recurrent latency. Considering the limited broadband of the channel, these factors become hard to address [18].

However, these implementations enable simple and punctual communications which can become suitable for certain services.

3.2.2 Internet over Power Lines

Internet over power lines is a solution to provide Internet connection in areas where there is not the required infrastructure [33,34]. For this, the proposal makes use of the electricity network which connects homes with the power station. Thus, the architecture is shaped by three main entities: a router installed in the subscriber's home, repeaters in the light poles of the network, and the node installed in the power substation. As a result, this solution provides high-speed Internet exploiting the path of the power lines. However, the proposal has faced multiple obstacles over the years, mainly derived from legal complaints.

The use of the Internet over the power network has been reported as an interference source for other communication frequencies [18]. This is the concrete case of the military radio frequencies which experienced problems due to the activity of the network. This obstacle has been a relevant problem which has stopped deployments of the proposal. Also, it has been demonstrated that, in spite of using an already existing infrastructure, it requires a significant investment. Finally, some reports [18] have explored that the solution is not able to provide speeds higher than one Gbps. As a result, there are years since the last announcements about a new prototype of the proposal. However, in case of the legal issues were solved, this alternative could be applicable to multiple scenarios.

3.2.3 Internet over Television White Spaces

Television signal makes use of a set of frequency bands which enables the transmission of the physical signal from tower emitters to homes [35]. With the aim of preventing the signal from interference, the spectrum is filled with unused frequencies. These are known as television white spaces and they can be used to transmit Internet packets. Considering that white frequencies count with a long-range and a great capacity to be transmitted over obstacles, they become a suitable option to provide Internet communication. For this, its architecture proposes to equip a gateway with a white space antenna which is able to communicate with another installed on the subscribed homes [18]. As a result, both ends perform bidirectional communication.

The proposal has been explored for years, studying its potential application for remote areas [36]. Results manifested how high-speed Internet was reached in homes [35]. However, some issues have become significant obstacles to using this technology. Communications over white spaces may lead to interference with close frequencies, which is the case with wireless microphones [18]. Also, since the use of television frequencies is strictly regulated, many countries define strict legislation about its exploitation. As a result, the legal limitations and the eventual interference have led to banish the proposal. Nevertheless, there are current proposals [35] which aim to explore local connections based on this technique.

3.3 Discussion

There are multiple proposals which aim to provide access to the Internet and data transmission in isolated rural areas. With the aim of studying its impact and viability, the most relevant works in the literature have been reviewed. As a result, this section collects the most relevant extracted conclusions.

Proposals found in the literature have been classified depending if they require to erect of new infrastructure or, on the contrary, are deployable over already existing resources. Considering this, it is possible to appreciate how solutions which deploy their own architecture result in more promising and interoperable alternatives. This is the concrete case of the cellular network and satellite Internet, proposals which have already demonstrated great performance in isolated scenarios. However, there are conditions which restrict its potential application, mainly caused by the high economical investment.

In the case of the techniques which work on top of other infrastructure such as TV white spaces or Internet over telephone/power lines, results become diffused. Over the years, prototypes and commercial services have been applied with irregular relevance. The recurrent interference of these systems, especially in the case of affecting other communications, has become a significant obstacle. Also, considering the harsh legal restrictions of these frequencies, the proposal can become hard to apply in some countries.

As a result, it is not possible to identify a technology applicable to all isolated rural scenarios. This is due to the varying and individual characteristics of the context. However, if the limitations raised in section two are considered, the application of DTN becomes suitable to provide data transmission. The low costs of deployment and maintenance, as well as the dynamic adaptability of the network, make this option a solid alternative to communication in rural areas. Also, the possibility to combine different techniques and technologies consolidates its capacity to adapt the solution to the particular requirements of the places. As a result, DTN can be considered the most appropriate technique for isolated rural areas.

4 Conclusion

The Internet has experienced great development during the last decades. However, there are still isolated rural regions which lack the required infrastructure to connect to the network. Factors such as geographical conditions and demographic characteristics make isolated rural areas a difficult context for Internet deployment.

In this paper, a comprehensive review of the alternatives to the Internet has been addressed. For this, a set of literary works have been studied, aiming to identify those technologies which provide communication in rural contexts. Moreover, a taxonomy of two main groups is provided, analysing communication solutions which require to erect of new infrastructures and those solutions which operate at the top of other networks. Among the reviewed contributions, proposals such as 4G coverage or satellite Internet have shown good performance,

becoming appropriate options to provide Internet in rural areas. On the contrary, other works such as Internet over television white spaces or Internet over power/telephone lines are finding significant obstacles to operating successfully. However, these proposals require a significant investment from companies and users, due to the limitations of geographic conditions. Hence, the alternative which achieves higher interoperability is DTN.

DTN is based on nodes that, when communication is not possible, keep the information stored. As a result, it is possible to achieve asynchronous communications between ends, integrating heterogeneous networks and different communication technologies. As a result, there is no technology applicable to all isolated regions. However, DTN is adaptable for those contexts where geographic limitations and investment constraints are relevant.

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EVeRS Emergency Vehicle Request Service

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Abstract. Emergency management services are typically centralized and only accessible through call centers, where specialized operators handle emergencies according to their type and severity, and manually allocate the required resources (ambulances, firetrucks, police patrols, etc.). During these phone calls, people requesting emergency services sometimes cannot provide accurate information about their location (e.g., when they are not familiar with the area) or about the emergency itself (e.g., when they are in shock and cannot appropriately explain what is going on). This may lead to delays or to the allocation of insufficient or inadequate resources. However, vague indications are not the only source of potential delays. Actually, the traffic conditions and the routes selected by the emergency vehicles strongly determine how fast they arrive to their destination. Nevertheless, operators can only provide callers with a rough estimate about how long they will have to wait to be attended and, if this information is not appropriately updated, callers may become increasingly stressed. In this context, we introduce *EVeRS*, a framework aimed at helping all the actors involved in emergency service request and attendance. *EVeRS* will provide *citizens* with a mobile app allowing them to contact emergency call centers, providing their precise location (via the mobile GPS) and interacting with the operators in a multi-modal way (starting a voice call or a textual chat, sending images or videos, etc.). This app will also provide them with punctual information about how their emergency is being managed (services involved, position in a map, time to their location, etc.). *EVeRS* will also support *emergency vehicles* with a mobile app providing them with optimal routes (shortest distance, shortest time, lowest traffic density, etc.), and call center *operators* with a web application centralizing all the information provided both by citizens and emergency vehicles.

Keywords: Emergency Management · Context-Aware Vehicular Routing · Smart Cities

1 Introduction

Nowadays, most citizens, around 83.32% [1] have a smartphone through which they access different services of interest, such as reading the news, accessing social

networks, exchanging messages with other people, shopping online, and playing video games, among others. This is why today's society is highly interconnected with each other through these types of devices.

However, there are certain services critically relevant to society that are outdated as they operate in the same way as they did a few years ago, without taking advantage of the inherent benefits of smart devices and their fast communications. These include emergency services, which are requested solely and exclusively through a telephone call, following a process that can be critical in terms of time, depending on the emergency, since it is necessary to wait for the operator to accept the call, the caller to explain the situation, indicate the location of the emergency (which can sometimes be unknown) and wait until the required vehicles are available, all in a non-transparent way for the user who has requested the emergency. It should be noted that, in addition, this process involves one or more people, with the possible errors and delays that it may cause and, considering that lives may be at risk in these emergencies, the time factor is extremely critical.

In some scenarios, emergency vehicle drivers must estimate the fastest route to reach the destination in the shortest possible time, while in other cases this task is relegated to an external navigation system such as a GPS. Even so, this type of system is not aware of the current and changing conditions of a city such as traffic density, possible accidents or breakdowns that disable complete streets, weather conditions, etc. In addition, in certain situations it is possible that the vehicles assigned to an emergency may not be the closest to the emergency, thus increasing the arrival time.

In this vein, this work presents the framework *EVeRS*, which allows interconnecting citizens with the different emergency services available in a simple and transparent way, also offering valuable information and services for each of the main agents of the system. This objective can be divided into the following sub-objectives, depending on the agents involved in the system.

- Offer a mobile application to citizens, specifically to elderly, that allows to:
 - Indicate the method to request an emergency service in an easy way.
 - Observe the status of the current requested emergency.
- Offer a mobile application to emergency vehicle drivers that allows them to:
 - Obtain notifications of emergencies near their current position.
 - Calculate a variety of optimal routes based on the contextual information of the city (such as weather, traffic density, etc.).
 - Notify the user that has requested the emergency about its status.
- Provide a web application that allows the emergency services operators to:
 - Obtain contextual information about ongoing emergencies.
 - Automate a large part of the process of requesting and managing emergency vehicles.
 - Store a log of all requested emergencies and their evolution.

The rest of the paper is organized as follows. Section 2 overviews related works; Sect. 3 outlines the architecture of the *EVeRS* framework and describes the behavior of each of its components, along with its workflow and some of its functionalities; and, finally, Sect. 4 draws some conclusions and future works.

2 Related Works

Due to the increasing use of mobile devices, there is a rising number of applications aimed at helping their owners in emergency situations by offering: (1) assistance manuals such as *First Aid and Emergency Technique* [2]; (2) survival manuals like *Offline Survival Manual* [3]; (3) user profile reports including *In Case of Emergency*, *ICE* [4] or *MedicalID* [5]; or (4) real-time information about nearby emergencies as *Citizen* [6].

However, these applications are mainly focused on providing information to citizens in case they find themselves in certain emergency situations but they do not connect with the associated services to take care of them. Within the field of emergency services management, in which the *EVeRS* framework is placed, there are several applications, each of them with different features, where their main functionality is allowing the citizens to request different emergency services (ambulances, police, firefighters, etc.) through a call automatically sending the user's position in order to better locate the emergency. These include:

- **my112** [7]: this application allows calling 112 directly, easily, and automatically, providing the location of the device making the call. In addition, it offers real-time alerts on nearby incidents such as accidents or fires, among others. There is even a variant of this application that is much more accessible for people with disabilities (hearing or language), known as “*112 Accessible*” [8].
- **AlertCops** [9]: it is the official application of the *Spanish State Security Forces and Corps (FFCCSE)* that allows calling directly to the nearest policemen, sending the location and the situation in which the user is (loss, thefts, aggression, mistreatment, etc.). It also offers a chat where photos and videos can be sent.
- **Emergency Plus** [10]: it allows calling the emergency services (in this case 000), quickly sending the user location to both the services and those users defined. Additionally to the emergency contacts, it also includes police assistance line numbers.
- **EchoSOS** [11]: it sends the user's current location when calling an emergency service not needing Internet as it is sent through SMS. It also allows to access information about nearby emergency rooms, but only in selected areas.

One of the main disadvantages of using these applications is that some of them are only available in some autonomous communities or cities and thus limiting their use in certain places. Another disadvantage is that none of them provide any feedback to the users that requests the services, so it is possible that, in certain situations, it can be confusing whether the service has been requested correctly or not. Nevertheless, some of the functionalities present in these applications have also been defined for the *EVeRS* framework, in addition to others that can be of great value to the end user, providing information associated with relevant emergencies.

3 The *EVeRS* Framework

The *EVeRS* framework includes two independent mobile applications, one for citizens (oriented mainly to the elderly) and one for emergency vehicle drivers, each one of them with its own customized views and functionalities. In addition, this framework also includes a web application oriented to emergency services, which provides different functionalities mainly associated with emergency real-time monitoring and management. The required components to interconnect these mobile and web applications, the internal API and middleware broker, are also included in this framework, see Fig. 1, along with external services required by some of the mobile applications.

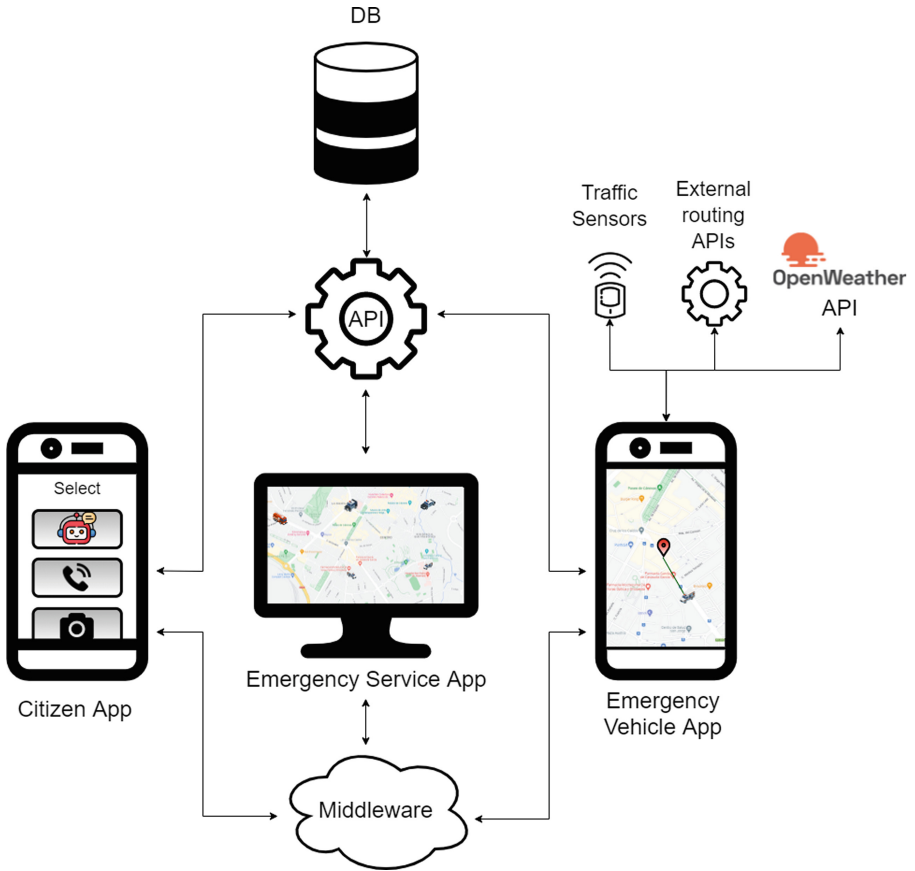


Fig. 1. Architecture of the *EVeRS* Framework.

- **Citizen App:** it is a mobile application where its main purpose is offering the tools to allow quick and easy interaction with emergency services by different contact means such as (1) a phone call, (2) a chat-bot or (3) capturing images or videos of the situation. Once the user has requested the emergency service, the application will display information associated with it, thus receiving feedback on the current location of the involved vehicles and their identification number or the remaining time to reach the indicated location, among other data; both features are shown in Fig. 2. Another feature available is to display the user’s nearby emergencies, so it is possible to be aware of the current situation in the city.

Considering that elderly people are not very used to using either complex phone calls or almost any kind of application, this application considers its needs and accessibility issues, e.g. using big icons and using easily differentiable colors. Even though the application itself is oriented to the elderly, it is also feasible to be used by citizens in general as it is an easy-to-use application.

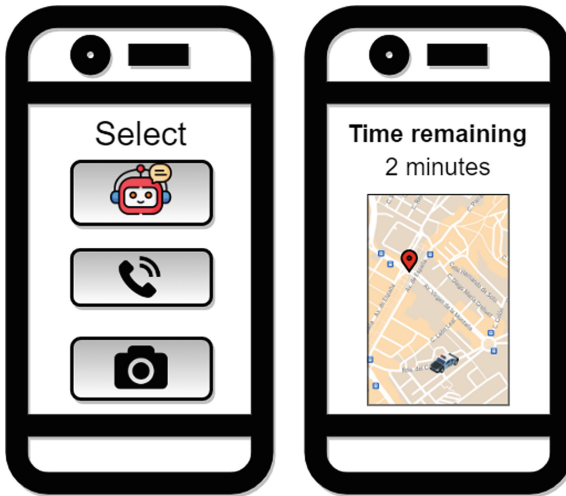


Fig. 2. Citizen App. *left:* Contact selection. *Right:* Emergency status in real-time

- **Emergency Vehicle App:** this application must be installed on the emergency vehicles drivers’ mobile devices and it will receive real-time notification in case a specific service is requested from the Emergency Service web application, for which the user can accept or reject the service depending on its current status (busy or available). In case of accepting the service, the application itself will obtain contextual information about the city using different sensors located in the city if available, as well as other metrics such as weather, using OpenWeather API [12]. With this information, it will request external routing services which is the most efficient route according to different criteria

(less distance, less time, less traffic, etc.), being shown after in the application, along with additional related information to the route, see Fig. 3.



Fig. 3. Emergency Vehicle App. Possible routes and emergency notification

Currently, route optimization is a widely studied area for both vehicular and communication networks. One of the main steps to calculate the optimal route between two points is to represent the topology complexity using a graph, with its features, such as the distance or inclination of the roads in the case of vehicular networks or bandwidth on communication networks. Once the topology is represented, a great variety of optimization algorithms can be applied to it, such as the following:

- **Classical routing algorithms** such as Dijkstra, Distance Vector, BreadthFirst Search or BellmanFord's, among others; e.g. Dan-Dan, Z. and Jun-Qing, S. [13] proposes a new algorithm based on Dijkstra for vehicle path planning considering intersection attributes.
- **Evolutionary algorithms** such as Ant Colony Optimization Algorithms e.g. Kumar, P. et al. [14] proposes an ant colony optimization algorithm with Internet of Vehicles for intelligent traffic control system; or Oranj, A. et al. [15] who proposes a routing algorithm for vehicular ad-hoc network based on dynamic ant colony optimization.
- **Routing algorithms using quantum computers** that are classical routing problems but being carried out by using quantum approaches; e.g. Rojo, J. et al. [16] have developed a microservice, that can be accessed

easily, to solve the Traveling Salesman Problem (TSP) using quantum programming.

These algorithms can be implemented locally on the mobile device but their use can also be relegated to external services, also known as Routing as a Service (RaaS) [17] so that the application itself will require fewer computational resources, facilitating its development and being considerably more efficient. In fact, in the field of quantum computing, Garcia-Alonso, J. et al. [18] work is currently underway to extend the OpenAPI specification [19] to be able to run any type of service, which would make it easier to implement new quantum algorithms such as routing algorithms, with the advantages this offers, especially in terms of computation time.

Additionally, it can happen that external services are not available or very busy to provide a route within a minimal response time. In these cases, the application provides several classical routing algorithms in such a way of providing always a possible route, even if it is not the optimal one in terms of computation time.

- **Emergency Service App:** the web application that is the main component and is mainly responsible for receiving alerts, calls, or notifications associated with an emergency from the mobile application of citizens and provides the necessary tools to assign a set of vehicles to the given emergencies. In addition, it will offer statistics of the different emergencies, along with the current status of all vehicles available to the system from their location (on a real-time map) as if they are occupied or free at a given time, see Fig. 4. Besides, there are also represented, with a red dot, real-time emergencies with related information. On the other hand, this web application is directly connected to an API that will allow to access all the information available in the system such as users or existing emergency vehicles, acting as a register of all the events that are processed using the framework and its responses. Additionally, it is also connected to a middleware through which is possible to get the status updates of the emergency vehicles or contextual information about the city such as traffic density or weather conditions. In this way, it provides a summary view of all the previous and actual emergency services along with the status of the city.

Lastly, the *EVeRS* framework workflow is shown in Fig. 5 where the process followed for each emergency event is as follows. First, the user that wants to request an emergency service will open the mobile application and select the method of contacting those services (by phone call, chatbot, etc.) sending his location automatically as soon as the contact is established. In turn, the emergency services operator will respond to the emergency by introducing the necessary data into the web application, which will then search for the required nearby vehicles available and notify them of the emergency service requested. At this point, the drivers of the emergency vehicles, through the mobile application, will be able to accept or reject the service depending on their current status for example being already on another service or free. In case of service refusal, the website is notified and other vehicles will be automatically searched for,

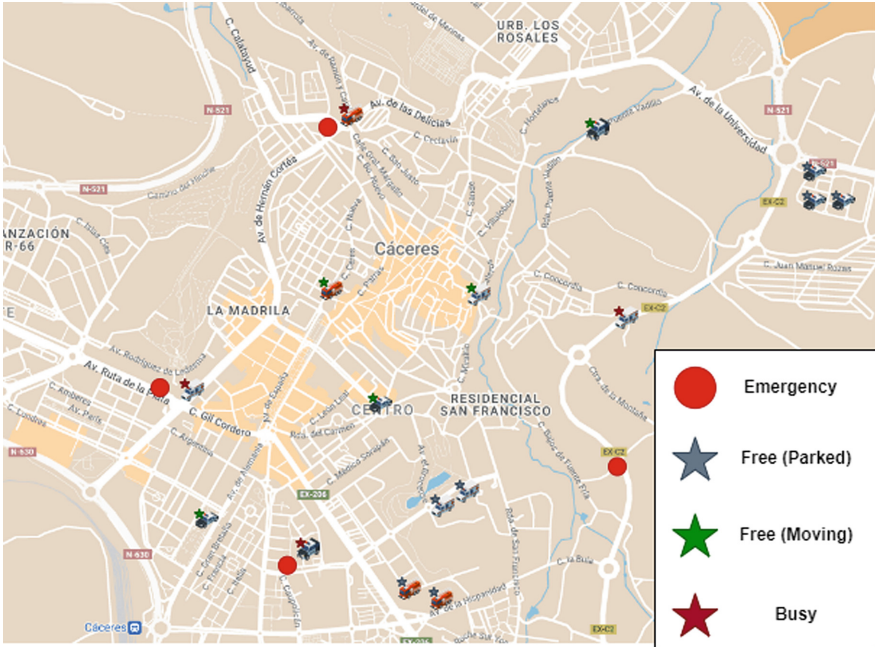


Fig. 4. Emergency Service App. Real-time map

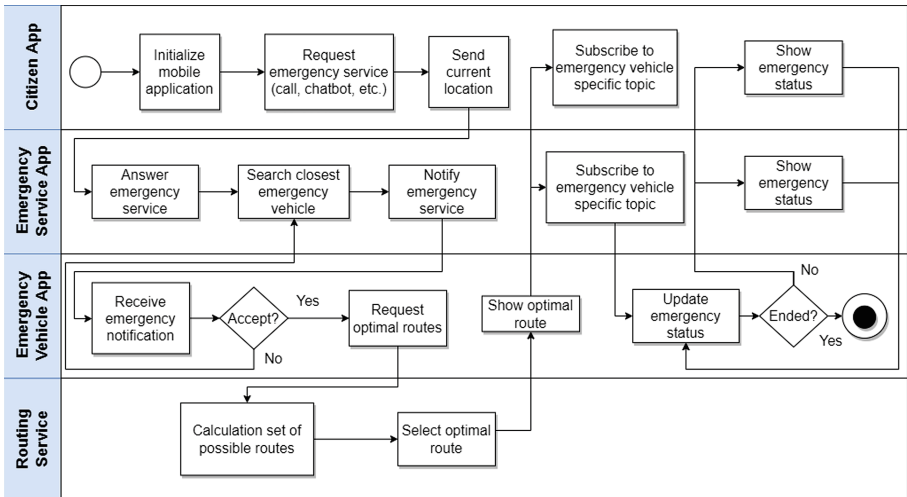


Fig. 5. Workflow of the EVeRS framework.

notifying again these new vehicles until any of them accepts. In case of acceptance, the application will automatically calculate, internally or using external services, the optimal routes showing them on a map to the user. From this point

on, both the service requester’s mobile application and the web application will obtain the information about the service by subscribing to the “topic” of the middleware where each vehicle updates its status (location, identifier, etc.) until the emergency is finished.

4 Conclusions and Future Works

This paper has introduced *EVeRS*, a framework aimed at easing emergency services management in a smart city, in particular focusing on three main aspects: (1) providing information about the emergency services requested to citizens; (2) providing the calculation of the optimal route given an origin and a destination being aware of the city contextual information such as traffic density or road conditions, among other aspects; and (3) acting as a record of all emergencies and their associated responses in a city. In addition, the architecture of the framework has been described along with its components, and its main features have been compared with other similar tools.

Among the possible extensions intended to be supported in *EVeRS* in the future, the following are worth mentioning: (1) integration of a real-time chat between the citizen requesting the emergency and the assigned vehicles; (2) management of traffic lights on the route followed by emergency vehicles to make traffic flow smoother in advance, thus allowing the emergency vehicles to arrive faster to its destination; (3) offering additional services to encourage the use of the mobile application by citizens; (4) develop tools to predict possible new accidents or emergencies based on historic data; and (5) integrate different city services such as a public transport, garbage trucks or postal mails.

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AQUATIME: A Technological Solution to the Dehydration of the Elderly

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Abstract. Purpose: Dehydration is one of the most important problems that older people. It is a principal cause of hospitalization. Extremadura has a big elderly rate. AQUATIME devices are a technological glass that we can to know the intake that we drink.

Methods: We analyzed the Aquatime devices use in a nursing centre on Extremadura, in Plasencia with 15 users with cognitive impairment for 3 months. We divided the sample in 2 groups. On the one hand, we interviewed with 6 healthcare professionals about the safety and relevance of AQUATIME devices. On the other hand, we evaluated the intake of 15 elderly users with the AQUATIME devices. After we analyzed the result with a statistical analysis software. This study was accepted by Ethics Committee for Drug Research in Cáceres (CEIm) with code 076-2021.

Results: Of the total sample of 15 users, the median age was 84 years IQR (70-95). The sample consisted of 66.6% of women and 33.3% of men. There is a significant difference in initial consumption and average consumption of 69,667 [-1557.5-1696.8] $p = 0.041$, with higher consumption in the middle of the project than the initial consumption based on the schedules of water contributions. One of the leading causes that interfere with the independent consumption of the device is the level of dependence in 50% of cases.

Conclusion: As a conclusion, we can say that the AQUATIME device facilitates the monitoring of users' liquid intake and is a user-friendly device.

Keywords: Elderly · New technology · Dehydration · Quality of life

1 Introduction

The increase in life expectancy leads to an increase in the population of the elderly [1], and with it, the resulting consequences and social needs that this

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change will produce in our society [2]. One of the most common concerns, which has serious health consequences, is dehydration in old age since decompensations can occur due to cellular ageing and loss of prototypical thirst sensation in this age range [3]).

Dehydration in the elderly is one of the first reasons for the hospital admission. This implies a significant expenditure of both human and economic resources, which could be reversed if such water decompensation was prevented [4].

The feeling of thirst is one of the first “losses” that can be experienced under normative conditions of ageing, and if this natural loss is added to the difficulties derived from cognitive deterioration in patients diagnosed with neurocognitive disorders, increased likelihood of dehydration in the sufferer [5].

The prevention of dehydration is an essential factor and can be solved with the help of technology currently available. The so-called “Information and Communication Technologies (ICT)” can play a significant role, especially in the contemporary society characterized by the difficulties primary caregivers face in providing adequate and permanent care for the elderly.

The AquaTime device is a glass consisting of a plastic container and a measuring sensor responsible for controlling the user’s fluid intake and issuing auditory reminders if the person has been without ingesting any liquid for a long time.

The AquaTime device is a glass consisting of a plastic container and a measuring sensor responsible for controlling the user’s fluid intake and issuing auditory reminders if the person has been without ingesting any liquid for a long time.

The main objective of this study is to evaluate the functionality of the AquaTime tool to prevent dehydration in elderly people with cognitive impairment at the “Los Pinos” Residential Center.

With the AquaTime device, you can record the number of liquids ingested per day, establish a target protocol per person based on their needs and monitor all that data to control each completely. AquaTime is an intelligent device consisting of a glass with an intelligent base (puck) in which different drinking containers can be connected, through which the intake of water is monitored and intended to motivate users about it (Table 1).

Table 1. Functions of AquaTime.

Measurement of the Amount of liquid ingested	Data logging in the cloud	Reminders
The device’s intelligent base (puck) records various parameters (weight, temperature, acceleration) Through these parameters, it measures the amount of liquid ingested by the user Displays the information on the screen	Intake data is recorded in the cloud The evolution of the user’s intake is shown in the application in the form of graphs: Daily average Weekly average	Parameters that can be adjusted according to the needs of each user: Start and end of the day: the period of use of the device Period and end of rest: period without notification Notification interval: time between each notification Notification type: light and sound (choice of light and melody)

2 Methods

2.1 Studio Design

A longitudinal, quasi-experimental, observational study of repeated measures has been carried out with an intentional non-probabilistic sample of the residents of the “Los Pinos” Residential Center, a population over 65 years old. From May to July 2022.

Pre-intervention and post-intervention data were collected. The data collection was divided into three parts; on the one hand; information was obtained on values of Na, Hemoglobin and Hematocrit in blood, pre and post. On the other hand, data were obtained from monitoring fluid intake through the devices, and finally, An interview was conducted with the professionals responsible for ensuring the correct functioning of the devices during the implementation of this residence.

This study was accepted by Ethics Committee for Drug Research in Cáceres (CEIm) with code 076-2021.

2.2 Participants

The following criteria were proposed for inclusion:

- The person over 65 years old
- Diagnosis of dementia: Global deterioration scale (GDS) with values between 3 and 6 [6].
- No severe behavioural disturbances.
- Informed consent signed by relatives or the management of the facility.

As a criterion for exclusion:

- Have severe or uncontrolled behavioural disorders.
- GDS greater than six and less than 3.
- Family members or management do not sign informed consent.

2.3 Instrument

The data collection tool was based on different platforms. In the case of data on the perception of the device’s usability, the collection was carried out through an online questionnaire where the qualities of the device were evaluated. On the other hand, the information related to the consumption of liquids in real time was collected through the historical data transferred to the cloud associated with the <http://app.AquaTime.tech> app through the narrowband protocol (GSM) of the Aquatime website.

2.4 Data Analysis

An analysis of variance was performed for repeated measures, which identified which variables were involved with behavioural changes in fluid intake.

For to obtain the results of the usability scale, a comparison of means was made.

2.5 Evaluation

The evaluation was carried out in different blocks:

On the one hand, the improvements necessary to achieve maximum efficiency of the device in the residential environment were recorded with respect to the following:

- System security.
- Operation of reminders.
- Weight of the device.
- Material/fragility of the device.
- Operation of the system.
- System connectivity.
- Transport of the device.
- Hygiene of the device.
- Health benefits.

The acceptability of the system by users was measured by taking into account the following:

- Usability scale of the system
- The scale of satisfaction of the system
- The scale of validation of the system
- Number of dropouts
- Rate of achievement of proposed targets

Finally, the historical intake of users was observed during the two months of the project.

2.6 Use, Confidentiality and Storage of Data

The tutors or persons responsible for the study participants signed informed consent. Confidentiality was maintained following current regulations: EU General Data Protection Regulation (2016/679) (“GDPR”) establishes the legislative framework for data protection and privacy issues in the Member States of the European Union since 25 May 2018.

The data will be stored on password-protected computers, accessible only to researchers responsible for data management and analysis.

Piloting with AquaTime took due account of all relevant legal requirements and ethical guidelines. It will comply with fundamental ethical principles in

the use of personal data and the participation of human beings throughout the development and tasks of the project. In particular, it will accede to the GDPR. In addition, since special categories of data will be treated (e.g., health data), FundeSalud and AquaTime adhere to national laws and regulations regarding the participation of human participants and personal data.

In particular, all participants were assigned case identities that were the basis for all subsequent analyses and will be the only identifying information in the dataset. The analysis was based on the investigation of the relationships between the general characteristics of the samples. It will never identify sure participants unless data have been obtained that confirm risk to their health. No information on the identity of respondents will be transmitted to any external body or organization; all data will be stored securely. Primary Users will identify with the mapping code provided by the AquaTime web application, while secondary users A and B will have an alphanumeric identification code.

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2.7 Financing

Funding for testing, including testing, human resources, insurance and travel expenses for logistics, was provided by AquaTime. 6.000 € corresponded to 1.000 € per month. The project did not provide any payment, nor did it have any cost for the participants.

3 Results

Of the total sample of 15 users, the median age was 84 years IQR (70–95). The sample consisted of 66.6% of women and 33.3% of men.

The sample was grouped according to initial, average and final consumption. The Correlation of related samples does not show significant differences between initial and final consumption with an average [IQN] 3180.3 [374.916-5985.75] $p = 0.887$. There is also no relationship between average consumption and final consumption, with an average of 31110.6 [4324.5-1116.6] $p = 0.90$. However, there is a significant difference in initial consumption and average consumption of 69,667 [-1557.5-1696.8] $p = 0.041$, with higher consumption in the middle

of the project than the initial consumption based on the schedules of water contributions.

Health professionals who participated in the study were asked about the relevance and perception of device users based on the characteristics of the target population, and one of the leading causes that interfere with the independent consumption of the device is the level of dependence in 50% of cases (Fig. 1).

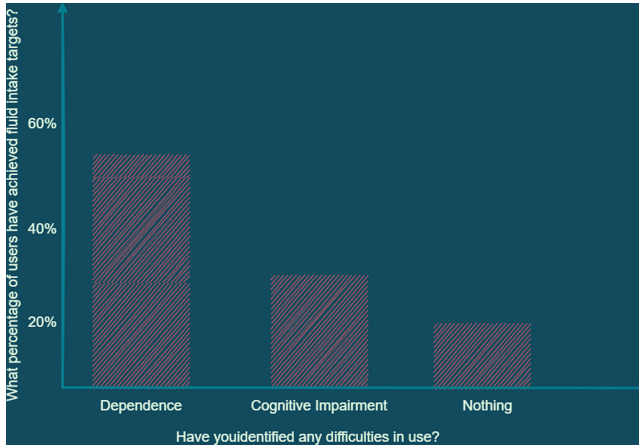


Fig. 1. Relationship between consumption and limiting factors of use of the AQUA-TIME Device.

Regarding the safety of the device, of the six health professionals asked, more than half said that the risk of use was low (Fig. 2).

There is a relationship between the perceived safety level of the device and the achievement of users' intake targets by increasing consumption as the safer device was perceived (Fig. 3).

4 Discussion

Based on our results, we could associate consumption with gender. As the time of use increases, consumption decreases in men and remains in women. Although the level of participation among all users has been good, the female population has been predominant in the study, which is why our data could be confused and, despite showing a significant relationship between consumption and gender, not a real difference. As the population ages, the population pyramid turns towards the female side. It is, therefore, a fact that women live longer, and the presence of these in elderly centres is a fact [7].

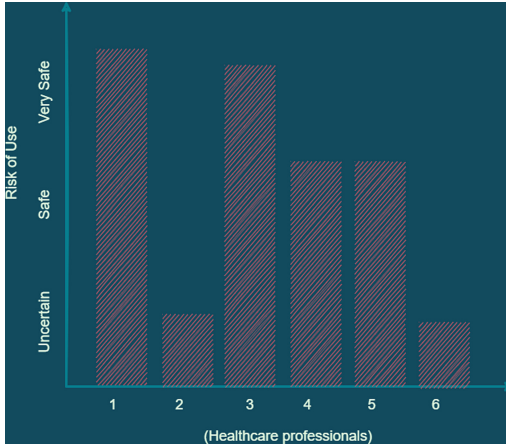


Fig. 2. Perception of the safety of the AQUATIME device according to healthcare professionals.

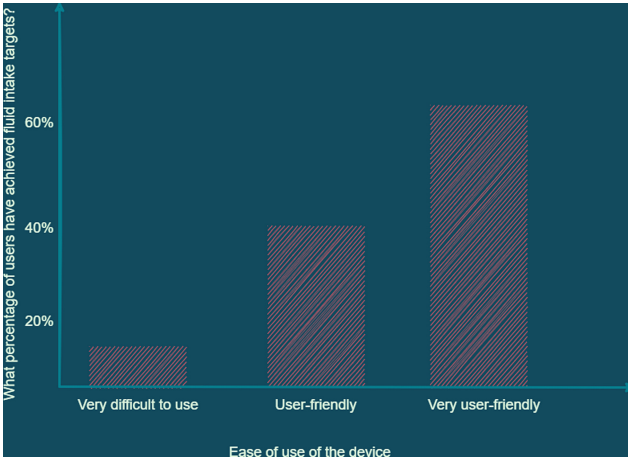


Fig. 3. Relationship between perceived ease of use and intake targets.

A pattern of consumption differed between men and women. On the one hand, men’s consumption skyrocketed when the AquaTime device was first used, and as the days passed, the consumption stabilized. On the other hand, the consumption in the group of women was not affected so drastically from the beginning. However, it was increasing gradually as the weeks progressed, reaching ingesting more fluid than at the beginning, following the work of Jaramillo-Echeverri et al., which in turn can affect your mental health and your ability to adapt to the disease. Suppose we stipulate this against the use of the device understood as adherence to treatments and use of support products. In that

case, it seems interesting to implant the vessel in those who are aware of their limitations or difficulties and are willing to combat them [8].

The achievement of intake targets by the older population is based on the need to keep the population hydrated. As the person ages, the feeling of thirst is altered, thus reducing water inputs. Dehydration is one of the leading causes of hospital admissions in people over 65 years of age, along with pathologies due to stomach infections and diarrhoea [9]. This data, together with the limitation in the daily activities of the elderly population with cognitive impairment, makes the device a good ally for prevention.

According to the health professionals surveyed, one of the main reasons the use of the AquaTime device could be limited is the presence of cognitive impairment in profound states. Dementia is defined as an acquired condition that.

According to the health professionals surveyed, one of the main reasons the use of the AquaTime device could be limited is the presence of cognitive impairment in profound states. Dementia is defined as an acquired condition characterized by impairment of at least two cognitive domains (memory loss, attention, language, visual-spatial functions, or executive functions). It interferes with the patient's social or occupational interactions [10], which is why the use of the device may be limited despite the visual and auditory notifications it presents.

As mentioned above, one of the main objectives that were set against the design of the AquaTime device was the simplicity and security offered. After asking the health professionals who were immersed in the realization of the project, they almost entirely agreed that it was a very safe glass and that, given its design, very easy to incorporate into the daily routine of users since "is the glass that anyone can have at home". Based on the article by Huinao, M "Occupational life" of elderly people living in the rural locality, it is observed that the subjective experience of symptoms and its influence on the productive role is what will directly influence their habits, roles and routines in the ageing stage [11]. The reason why the reception of the device has been so positive is that it has been a device that resembles the glass of life and because it allows keeping active the capabilities of the person to perform the task of drinking independently.

5 Conclusion

The use of the AQUEATIME device promotes fluid consumption. There is a relationship between the use of new devices and gender. On the one hand men use more the device at the beginning and decreases its use over time, whereas women have a more sustained use of new devices over time.

Declarations

- Funding: This study was funded by AQUATIME SL.
- Conflict of interest/Competing interests (check journal-specific guidelines for which heading to use): The authors not declare conflict of interest

- Ethics approval: Ethics Committee for Drug Research in Cáceres (CEIm) with code 076-2021
- Consent to participate
- Consent for publication
- Availability of data and materials: Not applicable
- Code availability: Not applicable
- Authors' contributions: Authors contributed equally to this work

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The Relationship Between Loneliness and Nutrition in the Elderly. New Technological Tools Available for Evaluation

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Abstract. The fast increase in aging population makes it essential to ask about problems that are more frequent and important every day, such as their nutrition and loneliness. Several studies have shown their remarkable relationship, and loneliness may be a detrimental factor in the diet of elderly, it from social meaning. At the same time, there are limited instruments available to assess the nutritional status, in its various physiological, psychological and social areas. Through this bibliographic review, it is aimed to objectify the relationship between diet and loneliness in the elderly, both positive and negative, as well as to analyze the few validated tools available for its evaluation. This relationship seems to be negative, being loneliness a detrimental factor in the diet of the elderly, from its acquisition, manipulation and ingestion. For this reason, it is important to develop new researches that includes the development of new technological tools that facilitate quantitative and qualitative analysis to improve the growing problems of this population group.

Keywords: Loneliness · Aging · Nutrition · Nutrition tools · Technology · Quality of life

1 Introduction

Some of the important terms that are addressed after the proposed problem are the aging of the population, the loneliness of the aged population and the decrease of the quality of life in all its areas, biopsychosocial.

There is no specific and homogeneous definition of the term “aging”. Many authors differ in its characteristics, so the most accurate criteria is to distinguish it as a dynamic and individualized process that occurs throughout the individual’s life [1], and is therefore directly related to lifestyle [2] that the person has adopted or can adopt through prevention programs to reach a state of health in which the individual can continue to contribute and receive from society, with its multiple benefits [3].

Due to the already known and the increase in life expectancy, this must be linked to a higher quality of life, reaching older ages in all spheres of the individual in the best possible way.

We can talk about loneliness as a result of the negative connotations that society has towards aging. The gradual loss (but accelerated in today's society) of the social and family network in the elderly causes the statistics of single-parent households in Spain to rise [4], reaching 638,000 single-parent households in Spain in 2018. In them, older people live alone, thus increasing feelings of loneliness in them.

In itself, loneliness is tied to the reality of the past and associated in turn with poor communication with the outside world, limiting and diminishing the functionality of the elderly. Technology plays a very important role in this area, helping to connect our elders with the outside world in all possible spheres. The impact of loneliness on the lives of older people is increasing due to extraordinary situations such as the COVID pandemic and many others that have been taking place for many years and that are being addressed, as well as the impact on the family, notably increasing cases of stress [5]. The absence of social relationships in the aging stage decreases the quality of life and well-being of our elders, thus increasing their biopsychosocial vulnerability [6].

Another factor to highlight that reduces and aggravates the consequences in the elderly is the scarcity of financial aid dedicated to issues related to aging, adding to the health precariousness [7].

Nutrition is an essential factor in the health of the elderly that contributes to a better quality of life and well-being, reducing morbidity. The way of relating to food changes over the years for physical, social and/or psychological reasons [8]. Just as we adapt certain aspects of life when a person ages, it is important to know how to adapt the diet according to the new needs of the individual. The social processes of mourning, retirement, decreased activity and functionality, and cognitive processes such as dementia, lead to a decrease in autonomy that will affect eating. Adaptation to these new needs will be more affordable with external help, in this case technology [9].

Adequate nutrition provides the elderly with the maintenance of health, avoids chronic diseases and improves the psychological and pathological level of the person. 85% of aging diseases are prevented with adequate nutrition [10].

Indicators of existing problems in the nutrition of the elderly are aging's anorexia and protein-energy malnutrition [10]. In aging's anorexia there is a significant loss of appetite related to the decrease in physical activity and basal metabolism [11]. Other factors that affect are the malabsorption of nutrients related to age, the decrease in socioeconomic level giving rise to less access to protein foods that are usually the most expensive and those of better nutritional quality, and the null contribution through supplementation due to the physicians are not used to prescribing these products in aging as a preventive measure, without the need for prior disease diagnosis [12].

The increase in dependency leads to less attachment to family members and fewer social relationships that could help resolve doubts about food and limit asking older people for help due to a lack of trust with those who can provide it. Loneliness is directly related to the loss of functionality, social status, family structure and increased difficulty in accessing social services. They lose interest in taking care of themselves and they move away from concerns about their health [10].

From a psychosocial point of view, eating is taken as a social act [13]. The loneliness experienced and/or felt in the elderly can generate lack of interest in relation to food, added to the ignorance and complexity of a change in habits in the elderly, necessary for their health. There are a series of psychological, cognitive and social processes that directly affect both loneliness and eating:

- Social isolation and lack of family support.
- Lack of extra-family support (retirement).
- Decreased socioeconomic level.
- Consumption of alcohol and tobacco as a social act.
- Unit for ABVD and AIVD.
- Sensory losses related to decreased appetite.
- Mental health problems.
- Polypharmacy.

All this must be considered when carrying out a nutritional assessment to detect needs in the elderly population. The needs generated by this problem will be an essential factor for good compliance with dietary recommendations and treatments focused on improving the nutritional status of the elderly population, and must be included in a dietary clinical history [13]. Before trying to change habits, we must make an exhaustive assessment, coordinating multidisciplinary, addressing all spheres of the life of patients and giving special relevance to the social and psychological environment.

In the SOLINUT study [14], it was concluded that the greater the intake of medications, the caloric intake of patients was reduced, causing micronutrient deficiencies and increasing morbidity. 52% of these patients felt loneliness, especially at night. 80% of them considered diet important.

Another study that attempts to respond to the problem presented is that of Rivero-Jiménez et al. [15] in which nutrition is addressed from a cultural point of view, being largely influenced by life history.

The relationship of the elderly with food and nutrition must have a continuity and affinity with their vital history. It is about enjoying it in all its dimensions, since loneliness diminishes it.

2 Objectives

Through this bibliographical review, we intend to analyze the relationship between diet and loneliness in the elderly, both positive and negative, as well as to carry out an analysis of the few validated tools available for the assessment and evaluation of nutritional status. And the implementation of measures for the prevention of morbidity related to food, for its improvement through technology.

3 Methodology

A bibliographic search for the present systematic review has been carried out in the following databases: Google Scholar, PubMed, Scopus and MedLine. The descriptors or keywords used for the searches, according to each database, have been:

Boolean descriptors and search operators

Loneliness AND Aging AND Nutrition

Loneliness AND Aging AND Nutrition tools

Loneliness AND Aging AND (QoL AND Nutrition) AND Technology

TOTAL SEARCH ITEMS = 102 (53 + 24 + 12 + 13)

As inclusion criteria, articles published since 2013, in English, Spanish and Portuguese, have been selected. Of the articles found, those that were repetitive and that did not exclusively address technological tools related to nutrition control in the elderly have been excluded.

The population to be evaluated has not been distinguished according to place of residence, rural or urban, or institutionalized or not.

The final objective is to carry out a review of already published articles to try to base a purpose that justifies research in the field of aging, on how to promote the development of technological tools that facilitate and improve the health of the elderly, from the perspective of the prevention.

4 Results

A study conducted in Turkey [10] aimed to analyze the nutritional status of people living alone compared to those in a family environment. There was the participation of 200 people who were taken as control those who lived in a family environment. Both underwent a geriatric questionnaire and MNA. It was found that people who live alone have a lower BMI, eat an average meal a day, hardly consume protein, fruits and vegetables, and have a low appetite. Their socioeconomic level was lower than those who lived with a family.

The need to interconnect and establish advances that generate improvements in the lives of the elderly can raise the question of what their relationship and interaction with the new technologies will be like.

In the study carried out by The World Café [16], the aim was to collect the perspectives, opinions and preferences of the elderly regarding the implementation of technology in their daily lives. The most notable concerns were whether technology could make them feel more alone and isolated; the social stigma attached to being overwhelmed by technology due to the onset of signs of dementia at these ages; One point in favor that they highlighted was the improvement in autonomy through these technological resources.

It is important to highlight the keys to the proper functioning and implementation of these resources, such as not underestimating the capacity of the elderly, but facilitating their use and addressing their concerns, most of them about privacy and confidentiality.

One of the technologies reviewed is the "Novel Assessment of Nutrition and Aging" NANA [17], a sensitive tool that is focused on improving data collection, integration and analysis of information on nutrition, physical and cognitive functionality and the User mental health. Composed of a Tablet, a webcam and a dynamometer in which the user fills in according to his day to day and performs a series of exercises to measure the aforementioned issues.

With them it is intended to improve the understanding of the relationship of the factors named above, and create new prevention strategies.

NANA is validated [18] in all areas except for the assessment of physical activity, which is not correct enough for its assessment. Certain limitations were found in the diet, in terms of estimation of portions and total kcal, due to the subjectivity of the users.

5 Conclusions

The aging populations on the increase generate problems to be addressed in today's society that must be alleviated in the best possible way. The high cost of nursing homes and the need to improve autonomy are also reasons to implement technological improvements aimed at aging in order to detect events that are preventable, thus covering social and ethical challenges.

These technologies must be affordable, accessible, personalized, accepted and useful. They should not replace human labor, if not facilitate it and in turn alleviate feelings of loneliness.

These technological tools make it easier for us to know the behavior and indicators related to the health of the elderly, detecting significant variations that may affect their health and indicate an existing problem. They provide individuality for the recommendations and treatments to be prescribed, and in many cases, they ensure early detection, which is important in prevention.

Conflicts of Interest. The authors declare that they have not conflict of interest.

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PARApp Pedestrian-Aware Routing App

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Abstract. Current navigation applications allow routes to be drawn between two different locations on a map, either within a town or among different cities. These applications offer routing services mainly for vehicles such as cars, motorcycles or public transport vehicles, but also for pedestrians. For vehicles, these applications increasingly take into account aspects such as fuel consumption or pollution. However, for pedestrians, most current applications only provide shortest distance routes, not considering other relevant aspects such as the profile of the users (age, physical condition, difficulties to walk-up stairs, wheelchair requirements, allergies, etc.) or the current traffic or weather conditions. In this line, this article presents *PARApp*, a mobile app that allows specifying the user's profile and, based on it and on the contextual information available about the city, allows computing the fastest (shorter distance), flattest (less slope), safest (in terms of accident rate), less crowded or less polluted routes. *PARApp* also considers user-defined exclusion zones to be avoided when computing the former routes.

Keywords: Context-aware pedestrian routing · Navigation apps · Smart cities

1 Introduction

The use of navigation applications has increased in recent years due to their efficiency and ease of use for a growing number of users, as the number of persons with smartphones is also increasing (164.2 million in 2021 [1]). Among their offered functionalities, the most relevant is the calculation of optimal routes between two points, based on different criteria (shortest distance or shortest estimated time) being also considered the selected mobility mode such as cars, bicycles, public transport (subway and/or bus), other services such as cabs, and even for pedestrians themselves.

In the case of vehicles, route calculation considers a wide variety of metrics such as road's inclination, traffic density in different areas, estimated time to reach the destination, expected traffic at a given time, and even vehicle type used, being different using a bicycle than a car or a cab. Besides, when using these kinds of transport modes, there are certain metrics that are not as relevant and are not used, such as the weather.

However, in pedestrian routes calculation, only certain city features are currently considered, such as the distance between two points or the inclination of the roads involved in the route, but not the user's physical conditions as there are some cases in which the proposed route may not be valid for the user, for example, due to mobility difficulties such as using a wheelchair or due to health problems as allergies. Some of the city features that are not used in the calculation of these routes include weather, state of the roads (possible accidents or roads in poor condition), pollution or areas where allergies may be increased.

On this basis, this work presents the mobile application *PARApp*, which allows defining the physical characteristics of a specific user, specifically oriented to elderly people, in such a way that these will be considered when calculating the routes between a specific origin and destination, along with contextual information of the city such as the weather or the particular conditions of each road. This application is an extension of one of the applications of the previously developed work SAMoA [2], a self-adaptive framework oriented to the aid of elderly people and their caregivers, offering two self-adaptive mobile applications that allow monitoring elderly people's mobility, alerting their caregivers when they leave their safety zones (previously defined) or change their daily mobility routines.

The rest of the article is organized as follows. Section 2 presents some related work; Sect. 3 describes the operation of the *PARApp* application; and, lastly, Sect. 4 outlines some conclusions and future work.

2 Related Works

Since the integration of GPS services in mobile devices, the number of mobility-oriented applications has increased, each one of them offering different features. Within mobility, we must differentiate between several types based on the transportation mode: (1) pedestrian mobility as *CityMapper* [3]; (2) vehicular mobility as *Waze* [4] or *Moovit* [5]; and (3) general mobility, including both, such as *Google Maps* [6] y *Maps.me* [7].

Within the pedestrian mobility area, several applications lay down into a similar approach to the one defined for *PARApp*, where it is used additional information when calculating routes between two different locations. These similar applications are:

- *Apertum* [8]: is a mobile application oriented to people with mobility difficulties (temporal or permanent) and the elderly, among others; offering the fastest accessible route between two places. It is currently limited to the city of Madrid in Spain.
- *Personalized Route Assistant (PRoA)* [9]: is a mobile application developed by the University of Granada, which allows finding routes (walking or cycling) based on different factors such as the slope or existence of stairs, also offering the possibility of adding leisure areas to these routes. However, *PRoA* does not use either the user's state of health nor the current state of the city when calculating these routes.

- *CoolWalks* [10]: a pedestrian-oriented mobile application that allows selecting those routes where there is a shade to protect themselves from the sun in times of intense heat as in summer. One of the limitations of this application is that it only works in a certain area of Barcelona.

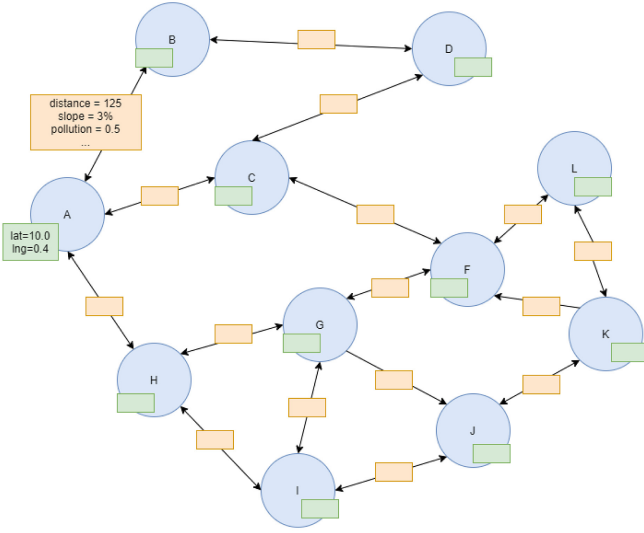
Even though there are several applications that allow defining routes based on certain user features, such as mobility difficulties, or city characteristics such as leisure areas and parks; none of them use real-time information about the city, such as the weather, or information about the user’s health, such as allergies or safety, to calculate and validate new routes.

3 The *PARApp* Application

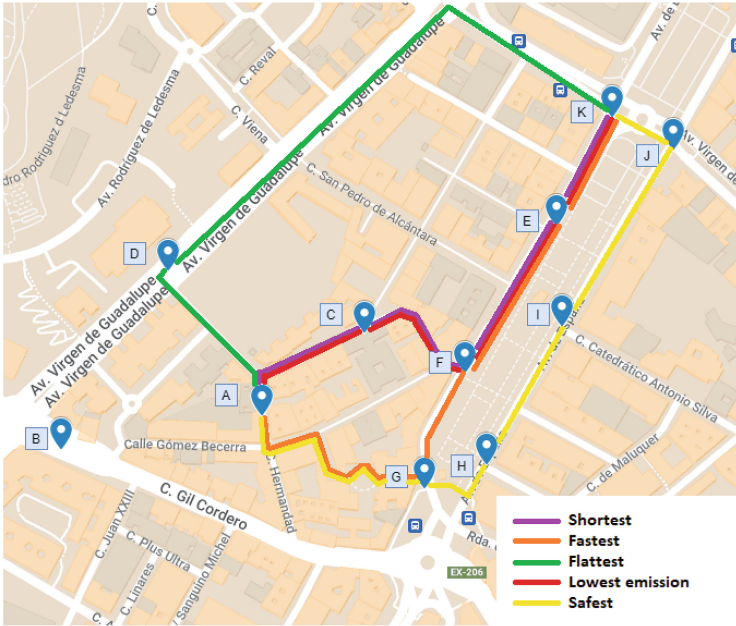
PARApp is a mobile app targeted to elderly people or people with physical difficulties, which computes and graphically displays routes between selected locations being aware of both the user profile and the current city conditions. *PARApp* is an extension of *SAMoA* [2], a framework aimed at monitoring the mobility of elderly people with Mild Cognitive Impairment (MCI). *SAMoA* allows defining user-specific security areas, based on which different alerts are submitted to the user caregivers to inform them about potentially dangerous situations. *SAMoA* is in turn based on *MoRES* [11], a mobile application aimed at helping elderly people grasp and comply with COVID-19 restrictions. Both *MoRES* and *SAMoA* use the RoQME [12, 13] infrastructure to identify hidden patterns in contextual real-time information.

Compared to *SAMoA*, *PARApp* gathers a richer user profile, including personal information about age, illnesses, allergies or physical difficulties. Besides, it also allows selecting the route origin and destination directly on the application map. Using these inputs, *PARApp* computes different routes, all of them taking into account the user profile and the current city conditions, the later retrieved from different data sources, such as OpenData city portals (e.g., the OpenData of Cáceres [14]), weather information (e.g., OpenWeatherAPI [15]) or the information provided by city sensors, when available. *PARApp* retrieves the city topology from OpenStreetMap [16]. When calculating the optimal route between the selected origin and destination, the application will calculate all possible routes within a radius of about 2 km around them, thus avoiding excessively long routes or those making no sense for pedestrian walks.

The retrieved topology and contextual information is represented using a graph (see Fig. 1a), where each node, displayed as a blue circle, represents an exact location of the city and the edges store the contextual information of the roads connecting them. Node attributes are displayed in green rectangles, while edge attributes (e.g. distance, slope, pollution, etc.) are displayed in orange ones. This representation allows calculating several optimal routes based on different attributes, each one weighted according to the user profile. The main route types currently supported in *PARApp* are: (1) shortest, (2) fastest, (3) least slope variation, (4) least pollution, and (5) safest. In addition, making use of



(a) *PARApp* road network graph.



(b) *PARApp* different proposed routes

Fig. 1. Network topology representation and possible routes

the *SAMoA* features, it is possible to define restricted areas through which the calculated routes should not pass.

For example, given the graph displayed in Fig. 1a, the application obtains the routes shown in Fig. 1b (see route descriptions included in Table 1). In this case, the user is an 82-year-old person with a strong allergy to pollen and some mobility difficulties, but not requiring a wheelchair. According to this profile, all routes that pass through areas where pollen may be present are eliminated and steep slopes are avoided.

Table 1. *PARApp* routes example from A to L.

	Route	Estimated time (min)	Distance (m)
Shortest	A C F E K	7	500
Fastest	A G F E K	6	600
Flattest	A D K	8	700
Lowest emissions	A C F E K	7	500
Safest	A G H I J K	6	600

4 Conclusions and Future Works

This paper has introduced *PARApp*: a mobile application aimed at providing elderly people or people with mobility difficulties with pedestrian routes, computed being aware of their profile and the current city conditions.

Possible extensions for *PARApp* include (1) optimization of the mobile device resources; (2) adding new data sources providing useful personal or contextual information; and (4) using external services to compute the optimal routes, for example, based on quantum computing [17].

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Technologies to Increase the Quality of Life of the Elderly Population



Acceptance and Adoption of Care Robots Among Elderly: A Critical Review of the Ethnographic Production

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Abstract. The progressive aging of Western societies and the challenges this poses for health and care systems has encouraged different types of technology to emerge as realistic solutions for the care of the elderly. Among these, robotic technologies, especially anthropomorphic ones, are becoming increasingly relevant in the care of the elderly. Regarding the acceptance of these technologies, in addition to the classical models of acceptance (TAM, MPT, HMSAM, UTAUT) there is a current of studies that proposes to study in depth the interactions between robots and humans (HRI studies) and in this field the ethnographic method is revealed as an optimal tool for a dense knowledge of the imaginaries and representations of technology, and therefore the elements that underlie its acceptance. Under this premise, the aim of the present work is to map the networks of meanings that operate in the processes of acceptance and adoption of robotic technology oriented to the care of the elderly. For this purpose, an exploratory review has been carried out, analyzing those ethnographic studies that address such processes. The resulting categories are framed within the main debates in HRI studies. The conclusions provide the reader with the deep keys to the acceptance by the elderly of robotic technologies of care.

Keywords: Robots · Ethnography · Elderly · HRI Human Robots Interaction · Care Technologies

1 Introduction

Demographic trends of the World Health Organization (WHO) draw a scenario of global ageing where the population over 60 years of age will reach 22% of the world's total, that is, more than 2 billion people in this age group [1]. This context of such a notable increase in longevity poses a series of challenges for governments, international organisations, and the scientific community, such as the sustainability of pension, dependency and health

systems, the coverage of carers in the face of the shortage of qualified professionals, or the development of appropriate active ageing policies accessible to the entire elderly population. [2, 3]. And although technologies, in various formats, have always been present in the care of the elderly [4], technological solutions have emerged as realistic proposals for addressing these situations in recent decades [3, 5]. With the advent of Big Data, the Internet of Things (IoT), and Artificial Intelligence, the creative possibilities of assistive devices for the elderly have multiplied [6]. This has led to a dense landscape of care technology outputs that is likely to continue to grow [7].

In this scenario of digitisation of care, robots are at the forefront [8]. They assist in daily living activities, provide companionship to reduce loneliness, improve cognitive abilities, or monitor adherence to therapy and vital signs, among other functions [9–11]. They are devices seen as optimal in “ambient assisted living” processes leading to de-institutionalisation and “home-based care” [12, 13], extending the stay of elderly people at home with the consequent benefits for their quality of life [14, 15]. And within robotic technologies, to specify the object of the research, the concept of a robot to be used in the analysis is that of a “social robot,” understanding these devices as intelligent agents, automated personal assistants, assistive technologies for living in the environment, narrative devices or embodied conversational avatars, according to the most widespread definitions [16–18]. In short, they are devices that favour an active interaction with the user, either because of their cultural skills, their anthropomorphic physical attributes, conversational skills through voice, and, above all, their ability to respond in cultural codes recognised as appropriate for a social relationship [19, 20]. Therefore, technologies that do not invite potential users to these forms of interaction due to their artificial intelligence or anatomical development characteristics are excluded (although they are sometimes referred to as robots, as is the case of some increasingly popular among the elderly, such as cleaning robots or kitchen robots) [21, 22].

The complex networks between humans and robots have been extensively addressed by HRI studies —Human Robot Interaction—, a multidisciplinary field where culture plays a leading role in the analyses [8]. For this last reason, ethnography becomes an optimal tool, as it allows for a dense insight into the world of meanings enacted by robot users, where cultural rules, social positions, and individual experiences converge [23]. However, for the specific issue of technological acceptance, user experience studies and technological disciplines have favoured the so-called technology acceptance models in their different variants: TAM, MPT, UTAUT, etc. [24–26]. This line of research can be greatly enhanced by the contributions of cultural studies applied to technology and developed with the ethnographic method. And that is the purpose of this research: to find out what ethnography reveals about the acceptance of robots, in this case, by the elderly, given the ever-increasing use of robots by this age group.

2 Objectives and Methodology

The aim of this article is to identify the bases that underlie the processes of adopting robotic technologies for the care of the elderly from an ethnographic perspective. With this objective, a scoping review has been carried out following the parameters set out in the proposals of Arksey and O’Malley [27] and Manchado Garabito et al. [28].

First, a preliminary literature review was conducted to familiarise the research team with the key terms in the field of study of ethnography and robotic gerontechnology, resulting in the following search descriptors: Ethnography AND Robots OR “Robotic Technology” AND Elderly. The search engines used were PubMed, Scopus, and Web of Science. Subsequently, three reviews of the articles were carried out. First, by title, then by reading the abstract, and finally with a full reading of the article. Likewise, a backward and forward citation search was carried out on the texts eligible for inclusion, inspecting the references cited in the main sources [29]. The exclusion criteria were: that the study was not conducted using the ethnographic method or that it did not include ethnographic reflections, that the main subjects of the interaction of the robots were not the elderly (age +65), that the devices analysed did not fall into the category of robotic technologies [10], and that the text did not mention processes, patterns or behaviours of acceptance, adoption or rejection of the robots by the elderly.

The search, review, and selection of materials were carried out between 28 September and 3 November 2022. This process has resulted in the identification of 11 materials that have been subjected to critical analysis by the research team. This has allowed the ordering of results and setting up of analytical categories on the main object of the research: the reasons for the acceptance and/or adoption of care robots by the elderly. The following table sets out the reference of the work while identifying the main ideas on the acceptance, adoption, or rejection of the robotic technologies concerned (Table 1).

Table 1. Reasons for acceptance or adoption of robotic technologies among older people

Reference	Reasons for acceptance or adoption
Gasteiger et al., 2022 [30]	Cultural competences Human facilitation Pleasant voice Comfortable morphology
Gustafsson et al., 2015 [31]	Pleasant morphology
Heerink et al., 2008 [32]	Cultural competencies
Hornecker et al., 2020 [33]	Support from care staff
Moyle et al., 2018 [34]	Neutral morphology Pleasant morphology
Pfadenhauer & Dukat, 2015 [35]	Pleasant morphology Human Facilitation
Sabelli et al., 2011 [36]	Comfortable morphology Conversational ability (voice and cultural competence) Cultural competence Support from support staff
Scerri et al., 2021 [37]	Pleasant morphology Neutral morphology

(continued)

Table 1. (continued)

Wright, 2019 [38]	Communicative contact (voice) Cultural competence Neutral morphology Human facilitation
Wu et al., 2012 [19]	Pleasant appearance
Yoo & Park, 2017 [39]	Conversational ability (voice and cultural competences) Cultural competences

3 Results

3.1 Human Facilitation

One of the keys to the acceptance of the technology that appears recurrently in the materials analysed is the need for a human introducer to facilitate the knowledge of the robotic device. Typically, it will be the caregiver who will encourage the interaction between the elderly person and the robot, providing not only a first technical knowledge and basic interaction skills [30, 35, 36] but also an affective approach that makes the device familiar to the user [36]. Depending on the degree of physical or cognitive impairment of the elderly person this accompaniment will last longer, as support for the possible handling of the robot and for interactions to facilitate the most independent use possible will be needed [30, 33, 36, 38].

3.2 Pleasing, Comfortable or Acceptance-Friendly Morphology

An appropriate morphology is another factor reported in the literature reviewed as favouring the adoption of robotic technologies by the elderly. Some authors emphasise dimensions that facilitate physical use [30, 31, 34, 37], others emphasise how pleasant to the touch [36], and others emphasise appearance. Regarding the latter, on the one hand, we find that in anthropomorphic robots, users' preference is for devices that do not exaggerate human features [19, 38]. In the case of zoomorphs, we find different opinions on the most suitable morphology for acceptance. Gustafsson et al. [31] point out that in the case of JustoCat, a robot cat, being a domestic animal, arouses a reminiscence that acts positively on acceptance. In contrast, Pfadenhauer & Dukat [35] point out that technical reproductions of domestic animals are often a poor reproduction of reality and lead to frustration due to unfulfilled expectations. This explains the success of the seal-shaped Paro robot, which looks like a cuddly toy: as it does not represent a domestic animal, a potential disappointment is not expected to happen (Fig. 1).

3.3 Voice Interaction

Voice interaction—both recognition, and use by the robot—appears as a key element in the acceptance of the robotic device. Sabelli et al. [36] emphasise the comforting element of greetings that create a family-like atmosphere. But it is the ability to converse and

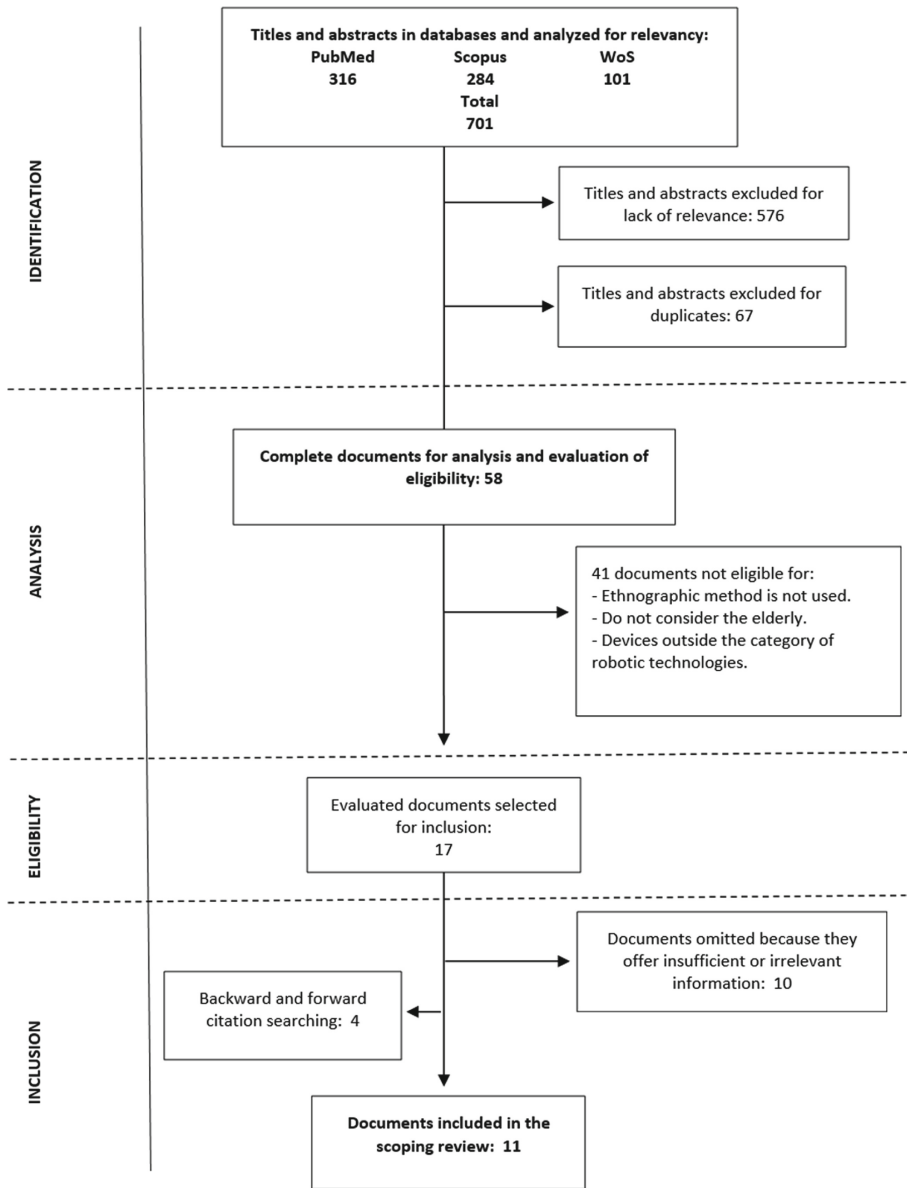


Fig. 1. Flow chart of the exploratory review. Source: own work

its effect on decreasing the feeling of loneliness which turns voice interaction such a decisive factor in technological acceptance processes [30, 36, 38, 39]. This should be followed by a technical adaptation of the voice interaction, where the robot properly interprets the elderly person, and at the same time, the device adapts to the possible hearing problems of the user [36].

3.4 Cultural Competencies

Interacting in the same cultural codes as the user facilitates the acceptance and adoption of robotic technology [32, 36, 38, 39]. For example, in the cases of the Pepper and Robovie robots, the knowledge of games, riddles, traditional songs, and the ability to communicate within the parameters of respect for the traditional Japanese family conveyed comforting sensations and helped their reception [36, 38]. The possibilities opened up by AI to enable robots to provide care focused on the user's state of health is another relevant factor for their acceptance [30, 36, 39].

4 Discussion

The categories that emerge in the ethnographic work as key to the acceptance of care robots are framed by the main debates about the adoption of robotic technologies. Firstly, it should be noted that while robots have shown great promise as a technology for elderly care, especially in high-tech countries such as Japan [38] or South Korea [39], concerns about these devices are still very common, both among professionals and elderly users who do not feel comfortable with them [40]. Regarding the latter, human facilitation of robot adoption is revealed as a key element in the literature reviewed [30, 33, 35, 36, 38], something that is not unique to the results of the present analysis but resonates with a general debate in the field of robotic care: the irreplaceability of human care. In this sense, Niemelä et al. [41] highlight the needs expressed by the elderly for human care, especially from their families, despite having care robots at their service. This is because, for the time being, the warmth and humanity provided by human caregivers cannot be replaced by technological devices [42]. This idea also has its critics, who value robotic assistance in a caregiver shortage scenario, where robotic care is preferable to foreign caregivers. This is because devices can be programmed with cultural codes adapted to the user, facilitating communication and thus avoiding the culture shock that would occur with immigrant caregivers. The most evident example of this position is Japanese techno-nationalism which, faced with a shortage of national carers and imbued with a xenophobic and tradition-preserving nature, promotes the replacement of carers of foreign origin with robots [38].

Following on human facilitation, it should also be noted that human facilitation will gradually disappear. The generations that are progressively entering old age are more and more familiar with the technical skills for the use of technologies, and, therefore, the task of introducing the devices and accompanying them in their use will be less necessary, except in cases where physical or cognitive deterioration makes this strictly necessary [7, 30].

In terms of appearance as an element of robot acceptance, the idea of neutral anthropomorphic morphology strongly emerges in the debates on robotic acceptance [19, 44]. The main hypotheses suggest that there is a predilection for robots with some human attributes, but without losing the appearance of a machine, given that the excess similarity with human anatomy and gestures ends up producing rejection [11, 19]. The basis for this hypothesis was put forward in 1970 by robotics expert Professor Masahiro Mori in the article *The Uncanny Valley* [45], where he stated that as a robot gains human traits, its acceptance increases until it reaches a point where the similarity causes strangeness and

unease in the user. And while Mori himself finds that this rejection can be overcome with very human-like devices that generate empathy, arriving at such designs is complicated, and he suggests that designers choose not to exaggerate the resemblance. In the case of assistive robots, this tendency towards feature neutrality seems to be reproduced. In the taxonomy carried out by Aceros Gualdrón [46] none of the humanoid robots have an appearance that resembles that of a flesh and blood person, except for the Nadine device developed by the Nanyang Technological University, which has a very successful human aesthetic, similar to that of a woman. However, these positions of morphological neutrality have been countered by those who propose the Concordance Hypothesis, where acceptance would be directly proportional to human resemblance [47, 48].

Voice has become the central element in the interaction of a multitude of care devices for the elderly [49–51]. The fact that the robots have a voice gives them an identity that makes them familiar to users [11] which encourages device acceptance. Regarding the type of voice, if they are very mechanical, with metallic sounds, they tend to be rejected. This was the case with Bomy, a robot whose voice was too artificial for users, to the point that it was one of the issues they pointed out as annoying and that had to be changed after a period of testing [30]. Tones and timbres also play an important role, as the Japanese version of the Pepper robot had a high-pitched, squeaky voice [38], which is not the most appropriate for a care device. Also, the idea that women's voices are more universally accepted [52] has spread to technologies, especially voice assistants [53]. However, in the field of care, it seems that the acceptance of women's voices also responds to the translation of sexist stereotypes, where care is framed within the feminine universe [52, 54]. To counter this frame, voice-neutral devices have been developed [55].

Closely related to voice —as a fundamental part of human-robot interaction— are the cultural competencies of the device. These are also key to the acceptance of the devices. Firstly, the ability to converse in cultural codes recognisable to the user reduces feelings of loneliness, one of the main problems faced by the elderly [36]. All of this has the potential to improve substantially thanks to the learning capabilities that machine learning, IoT, and AI are providing to technological devices [7]. Furthermore, if the devices are trained to adapt to the work culture of their workspace, as in a nursing home, this will boost their social acceptance by caregivers and users [56]. Likewise, training the robots in the identity and cultural codes of the users will encourage their acceptance, for example, by evoking memories through culturally familiar music, readings, etc. [57].

5 Conclusions

Although ethnography has proven to be an optimal tool for understanding complex social and cultural networks between humans and non-human agents, and while HRI studies have incorporated it as a knowledge strategy, acceptance and adoption of robotic technologies have not been relevant issues in most of the works reviewed. The research that carried out this work highlights the importance of several elements in robots that are conducive to their acceptance by older users. Firstly, the need for facilitation by human caregivers. Secondly, the use of morphologies facilitates use while enhancing pleasantness for the user, highlighting the neutral anthropomorphic configuration. Thirdly, studies emphasise that robots should listen to users' voices and that they should also

be able to communicate with their voices. Finally, the development of cultural competencies adapted to the users' context that allows them to interact appropriately with the robot will be a fundamental key to its acceptance. As a proposal, the design of robotic technologies for elderly care should take all these elements into account.

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Identification of Barriers and Facilitators of the Use of Digital Tools in Healthcare in Primary Care Home Settings

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Abstract. One of the strategies of the health systems is the digitalisation of the actions being carried out.

The ageing of the population is a fact, and it is the elderly who most need to be monitored at home in order to be able to provide them with quality and efficient care.

We conducted a systematic narrative review to identified barriers that prevent or hinder the implementation of digital tools that make the care provided in the environment inefficient.

Keywords: Telemedicine · Barriers · Facilitators · Patients · e-Health

1 Introduction

Our work is framed within the research into new digital tools and their implementation in a real healthcare environment focused on a population, the over-65s, who, due to their characteristics, have not been able to enjoy a digital environment that allows them to acquire digital skills to be able to deal with new technologies, some of which are focused on the application of healthcare through a digital environment that is now being developed.

In 2005, by means of a WHO resolution, as an organisation specialized in health and whose objectives include preserving health, it called for the development of long-term strategic plans to implement e-health services.

In 2013, and continuing along this path, governments were urged to create a comprehensive national e-health strategy.

In 2018, the need to implement a global digital health strategy was identified.

With the emergence in 2019 of the global pandemic caused by Covid, the urgent need to develop such a global strategy on digital health became apparent, and it was at the 73rd World Health Assembly that the global strategy on digital health 2020–2025 was endorsed in decision WHA73(28) on the global strategy on digital health (1,2).

With the creation of the Digital Compass 2030, the European Union establishes a monitoring system for digital implementation. Digital health solutions are proposed. By 2030, it is planned that “all European citizens will have access to their health records” (3).

According to a recent study, Spain is in the group of technologically intermediate countries, which means that there is still a long way to go to invest in new technologies to reach an optimal level at European level (4).

It was not until 2021 that 6.9% of GDP spending on public health was reached, and health managers must seek the sustainability of the system and the implementation of new technologies to improve the efficiency and quality of services, implementing projects to prevent deterioration (5).

The implementation of new technologies, required by the Digital Transformation Plan for the General State Administration and its Public Bodies (ICT Strategy 2015–2020), has led to the implementation of new resources, including electronic prescriptions, electronic medical records and electronic appointments, with telemedicine remaining in limited use, at around 2.6%, which needs to be implemented (6).

The latest WHO health report highlights the differentiation in life expectancy and years of healthy life and the level of development of the country, with a large loss of years depending on the economic characteristics of each country. (7).

To this we should add that the age of the patients most frequenting health services in Spain are those over 75 years of age, with 44% of the consultations for the review of illness being the most demanded, followed by 34.6% for the diagnosis of illness or health problems (8).

If we also add that more than 90% of the population aged 75 years and over refer to some chronic pathology, we can consider a scenario of urgent health care action (8).

On the other hand, studies indicate that the use of digital tools within Information Technologies are essential to face the new scenarios that arise (5,9).

Telemedicine has been seen as a means of communication between the patient and the health system for the monitoring of chronic diseases during pandemics (10–12).

The telemedicine most widely implemented in Spain is teledermatology and teleophthalmology, present in 11 Autonomous Regions, oral anticoagulant teletreatment and telecardiology in 9 Autonomous Regions, teleneurology, teleneurology, teleneurology and telecare developed by nurses in 6 Autonomous Regions (6).

It should be remembered that telemedicine is one of the new digital tools being implemented in Spain, along with electronic prescriptions, electronic medical records and electronic appointments.

However, the implementation of these digital tools varies greatly depending on the autonomous community in question, with telemedicine always being the least widely implemented.

Furthermore, the Digital Health Strategy has been agreed, where, in the period from 2021 to 2026, strategic objectives must be achieved, including innovation in health oriented towards 5P medicine (population-based, preventive, predictive, personalised and participatory) through lines of action in which the development of digital health services oriented towards people, organisation and processes predominates in order to achieve health protection (13).

Telecare, developed by nursing, has an important role to play here as it would be included among the new technologies to be implemented and developed and its potential for success according to the objectives to be achieved as an innovation that would reach the population with preventive and health promotion measures, more personalised, which would try to cover the monitoring of chronic diseases in a primary health care environment.

For the implementation of new digital tools and their acceptability to users, the situation of the population to be served must first be assessed.

The acceptability of use of the tool in question should be investigated, through performance expectations and expectations of effort, social influence and trust, analysing the barriers limiting implementation and the facilitators of tool use.

2 Objectives

Identify the existing barriers that limit users of digital tools in order to be able to act on them to reduce or eliminate them.

Identify the facilitators of use by users, in order to encourage them to accept the new tools (14).

3 Materials and Methods

A systematic narrative review was carried out in the PUBMED, SCOPUS, TRIP-DATABASE databases, using the descriptors “telemedicine”, “e-Health”, “patients”, “nurse”, “barriers”, “facilitators”, using the Boolean descriptors “AND” and “OR” as follows: “Telemedicine” OR “e-Health” AND “Patients” AND “Nurse” AND “Barriers (title) AND “facilitators” OR “Enablers”.

The search focused on the years 2017 to October 2022.

Inclusion criteria were set to be systematic narrative reviews based on qualitative studies. We believe that this type of study possesses the criteria to better understand how interventions are integrated into the daily routine of users (15,16).

As exclusion criteria, languages other than English, Spanish or Portuguese were set as exclusion criteria, as well as being able to freely access the documents and not meeting the inclusion criteria.

Once the initial search was refined, excluding all articles that were not narrative reviews based on qualitative studies and excluding repeated studies that did not meet our inclusion criteria, our search yielded a total of 9 narrative reviews distributed in the following databases:

Pudmed: 5

Scopus: 1

Tripdatabase: 3

We then went on to an in-depth reading of each article, extracting, from each one, the barriers and facilitators of the use of digital tools identified in each study.

4 Results

The evaluation of the studies identified the attitudes of the population that pose a barrier to the efficient implementation of new modalities of health monitoring in populations.

We highlighted 4 main themes that group together both barriers identified by users and facilitating conditions for the uptake and use of digital tools (17–25).

The four themes are:

1. Motivation and personal dependence, encompassing users' need to maintain the level of health, choices to maintain or implement it.
2. Personal values and life, looking at how busy daily life influences the choice to use these tools to achieve an optimal level of health through them.
3. De facto commitment to use and utilisation, which is influenced by the method or strategy to engage users in their use and continued use.
4. Quality of the devices or tools, perceived by users for their use and the ease of interaction with the tool for continued use.

We can highlight the following as the main barriers within theme 1:

- Not seeing the value or usefulness of the new tools.
- Not understanding the improvement of health through these means.
- The constant reminders about health actions remind them of the faults they produce with feelings of guilt.
- Seeing new technologies as “something” only for entertainment.
- Use of other systems to remind them of health actions, either through diaries, family members, calendars, alarms, etc.....

Within the set of ideas that encompass values and personal life, we find:

- Very competitive and busy lifestyles that prevent or hinder the use of these tools that could allow them to empower themselves in health to achieve a good level of health.
- Costs of the tools. It should be noted that access to a fixed internet network is an expense for families who could invest this money in other needs.
- Fears about security and privacy of data handled on these devices.
- Poor educational level in terms of digital skills.

In the group that encompasses commitment to use and participation and continuous use of these tools, we highlight the following as the main barriers:

- Difficulty in understanding the messages to acquire the commitment to use.
- Lack of support from family, friends, partners.....
- Lack of advice and recommendations by staff with the power and authority to accept it.
- Lack of support from health professionals.

Finally, within the set of barriers to the quality of the device, we find:

- Difficulty in using the devices.
- Lack of credibility in the use of the devices and the benefit of their use.
- Complex system for accessing the tool (certificates and electronic signatures).
- Abuse of the use of digital tools for monitoring health levels.

But we have not only identified behaviors that hinder the adoption of new care systems based on technological tools.

We highlight that there are behaviors that favors the implementation of such systems, and within the set of ideas on motivation and personal dependence we highlight the following:

- Ease of access to information that they could not access before.
- Help in motivation to carry out activities.
- Search for mechanisms to increase healthiness.
- Reduced anxiety due to easier access to information.

Within the item values and personal life, we found:

- Adaptation of digital tools to the current standard of living.
- High awareness of the benefits of using these tools.
- Data protection and use of data with high levels of security.
- Possessing good computer equipment, communication systems and optimal data plans that favors the use of tools.

We found facilitators for acquiring a good commitment to use and daily use, the following ideas:

- Health staff act as a watchdog and support in the use of these tools, being knowledgeable about the subject.
- Support and recommendation by family, friends, partners,.....
- Clinical accreditation of the tools with good support aids.

Finally, on the issue of the quality of the devices, they must have certain characteristics that facilitate their use, such as:

- Ease of connection and use, encompassing the characteristics of automaticity in the connection and integration of the connection system.
- Social support and prestige in use.
- Negative experiences in accessing the health system in a personal way that favour use due to easy access through these devices.
- Interaction and follow-up with the healthcare provider, avoiding depersonalisation.

5 Discussion

In the implementation of digital tools we see how getting good interaction and inclusion of the use of digital tools in a daily way in people's lives is a challenging task. Identifying barriers and enablers within our population must be done on a daily basis by healthcare providers to identify both strengths and weaknesses and take action. It is common knowledge that if we use tools that are very difficult to use and do not understand how to use them, what they are for and whether they will truly provide benefits to users in improving their level of health, they will not be used.

A new responsibility will fall on health professionals with the assumption of appearing as a link, not only to the health system but also to this new type of electronic access and monitoring.

The population must be educated in digital health, especially when this population, such as users in rural areas, have never had access to these systems, whether for economic, cultural or prestige reasons, or simply due to lack of knowledge.

The population must be empowered with knowledge and skills to favour an optimal implementation with the maximum effectiveness and efficiency that will result in a better control of the level of health at a personal level and an improvement in the monitoring and control of the population to be attended.

6 Conclusion

The implementation of digital tools to be able to apply care to patients in home environments must always be accompanied by an assessment of the population in order to find out what barriers we will encounter when implementing a new tool or the mechanisms that will facilitate its implementation and achieve total acceptance by the population. To this end, the healthcare professional must be attentive to this evaluation in order to carry out health education, focused on explaining the benefits of its implementation, eradicating false beliefs about the new tools and reducing the anxiety generated by the change to a new working system.

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Nursing Interventions in the Prevention of Pressure Ulcers Associated with Medical Devices in Intensive Care: A Scoping Review

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Abstract. Pressure ulcers are a recurring problem in the hospital environment, directly related to the health status of individuals. In critically ill patients, admitted to intensive care units, these lesions often appear associated to the medical devices to which they are connected. The literature review concludes that, sometimes, nursing interventions to prevent these injuries are undervalued hence, associated with the risk factors of critically ill patients, it leads to an increase in the incidence of injuries. The present Scoping Review aimed to answer the research question, formulated according to the PCC acronym: “What are the nursing interventions for the prevention of pressure ulcers associated to medical devices in intensive care units?”. The data search made in the MEDLINE and CINAHL databases, with inclusions criteria, allowed the identification of primary and secondary articles published between 2017 and 2022. The results of this secondary study show the medical devices that are most associated with pressure injuries in intensive care units are the nasogastric tube, the non-invasive ventilation face mask, the urinary catheter, the pulse oximeter, the electrocardiogram monitoring electrodes and venous catheters. Preventive measures include: nursing care in the fixation of medical devices; frequent repositioning of medical devices; protection and padding of body areas in contact with medical devices; replacement of rigid devices with flexible devices, when available; professional attention so that medical devices are not under patients; early assessment and removal of medical devices when clinically possible. It is concluded that as the incidence of this problem is an indicator of the quality and safety of health care, health institutions should implement policies to assess, prevent and treat it. There is a need to think of technological solutions that can reduce the risk and/or achieve the determination of skin changes suggestive of risk of injury.

Keywords: Nursing care · Prevention · Pressure ulcer · Intensive Care Unit

1 Introduction

Pressure Ulcers (PU) are prevalent in healthcare, in part, due to the various factors that can lead to their origin, such as immobility, incontinence, skin characteristics, sensory perception and the client's state of consciousness [1]. People hospitalized in Intensive Care Units (ICU) are more susceptible to the appearance of this type of injury, because in addition to being connected to a wide variety of medical devices, they present risk factors related to the disease and state of health, which give them greater vulnerability [2, 3].

Studies indicate that pathophysiological events such as hypoxia, changes in hemodynamic stability and tissue perfusion, need to use vasopressor and inotropic drugs, associated with greater fragility and vulnerability, as well as possible tissue failure are the main cause of PU prevalence [1–4]. They also refer that all these criteria, in association with greater immobility of clients, administration of sedatives and intravenous analgesics, mechanical ventilation and the critical condition of the client, promote the risk factors for the development of PU [2–4].

Hospitalization of more than 10 days, greater number of medical devices used in the client, history of diabetes mellitus and kidney injury, hypercapnia, hypoxemia, hypotension, gastrointestinal hemorrhage, edema, parenteral nutrition, use of vasopressors and sedatives and low score on the Braden scale, due to sensory limitations, mobility and poor nutrition are identified as major causes of risk for people in ICU [5, 6].

Some of the PUs are associated with medical devices and a study observes a prevalence of 0% and 33% in the 30 hospitals where the investigation took place [5]. Contrary to what one might think, medical devices do not only cause category I or II injuries, they are also associated with deep tissue injuries (III and IV) and those of an indeterminable degree [1, 5]. The most affected areas of the body are the fingers, nose, mouth and lips, cheeks and legs [5].

Regarding medical devices, oximeters, endotracheal tubes, nasogastric tubes, CPAP and BiPAP masks, high-flow nasal cannulas, bone traction devices, chest tubes, thromboprophylactic stockings and urinary catheters are those that are mostly responsible for these lesions [5–8]. The odds of developing PU associated with medical devices increase by 5% per day of ICU stay and 23% for each device present in that person [7].

The the European Pressure Ulcer Advisory Panel, National Pressure Ulcer Advisory Panel and the Pan Pacific Pressure Injury guidelines recognize the risk of injury to people with medical devices and recommend that nursing care integrate interventions to mitigate or eliminate the risk and increase the safety of patients. Most vulnerable people [9].

In view of the above, the objective of this study is to identify nursing interventions for the prevention of pressure ulcers associated to medical devices in intensive care units.

2 Method

In view of the objective of the study and after a first review of the literature to identify literature on the topic, a scoping review was chosen to determine the existing evidence on a given topic, regardless of the type of evidence and its quality [10–13]. This type of systematic review is useful because of its broad nature, as it aims to provide a map of the evidence that has been produced on a topic [10, 13].

The research question, formulated according to the PCC acronym is: “What are the nursing interventions for the prevention of pressure ulcers associated to medical devices in intensive care units?”. Being “P” the Population, “C” the Concept and “C” the Context [10, 13]. For the present scoping review, the following eligibility criteria were defined for the studies of the bibliographic sample: Population: adults and elderly people hospitalized in ICU, connected to medical devices; Concept: nursing interventions to prevent PU associated with the same devices and Context: ICU. The following were defined as exclusion criteria: studies addressing a pediatric population (under 18 years of age); adult and elderly population who are hospitalized in ICU, but who do not have medical devices; nursing interventions other than prevention of PU associated with medical devices; opinion articles and addressing contexts such as: inpatient services, emergency services, community services and residential structures for the elderly.

In order to carry out the literature search, terms in natural and indexed language were used (MeSH (Medical Subject Headings) terms for the Medline search and the Subject Headings for CINAHAL).

The research was carried out in June 2022 with the help of the Boolean operators “OR” and “AND”. The query built for use in the aforementioned databases was [(elder* OR age* OR old* OR older person OR older adult OR frail older adult OR frail older adults OR adult OR young adult NOT adolescent NOT children NOT neonatal) AND (nursing prevention intervention OR nursing preventive care OR nurs*) AND (pressure ulcer OR pressure ulcers OR pressure ulcer* OR pressure injury OR pressure sore* OR pressure damage OR decubits ulcer OR MDRPU OR medical device-related pressure ulcers) AND (technology OR devices OR equipment OR material OR tools OR medical devices OR medical equipment OR medical tools OR medical technology OR medical device related OR device-related OR medical device OR equipment and supplies) AND (intensive care unit OR intensive care OR intensive medicine unit OR critical care OR critical patient OR ICU NOT neonatal intensive care NOT pediatric intensive care)].

Articles that have full text available were also defined as inclusion criteria; primary and secondary articles; dated between 2017 and 2022, written in Portuguese, Spanish or English.

After identifying the articles that answered the research question and met the inclusion criteria, a search was carried out on Google Scholar and repositories of reference in the area for the identification of guidelines and gray literature on the subject.

The screening process of the articles was carried out by 2 researchers, independently, and the non-conformities were evaluated by a third reviewer [10]. To extract the content of the articles, a table was created in which the following was recorded: identification of the article; authorship, year and type of publication; method and main results/conclusions. The results of the articles that allowed answering the research question were extracted and submitted to narrative synthesis.

3 Results

The first search carried out resulted in 533 articles. After applying the inclusion criteria, 130 articles were obtained. Subsequently, the titles of the articles obtained were read, and 114 articles were excluded. 16 articles were read in full and 4 were included that answered the research question.

The articles included by abstract and full reading were essentially incidence and prevalence studies, etiology studies and economic studies.

The search in the gray literature allowed the identification of 37 articles, but only 2 answered the research question.

To facilitate the understanding of the research carried out and the results obtained after the inclusion and exclusion criteria, a Prisma Flow Diagram was prepared (Fig. 1), presented below.

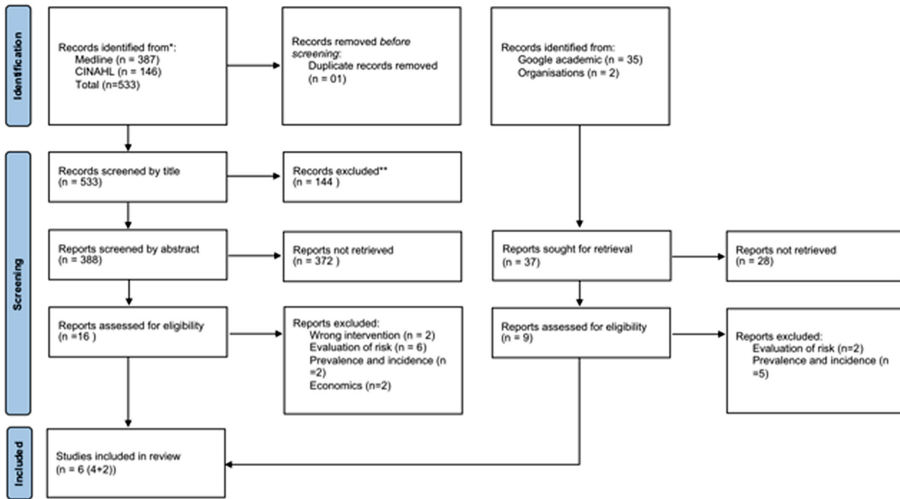


Fig. 1. PRISMA ScR. Lisbon, 2022.

The 6 studies comprising the bibliographic sample were published between 2019 [14–16] and 2022 [19], 4 were carried out in Brazil [14, 16–18], one in the USA [15] and another in the United Kingdom [19]. The study designs are heterogeneous (Table 1) but allow to answer the study question.

Table 1. Studies constituting the bibliographic sample. Lisbon, 2022.

Article/year/country	Type of Study	Objectives	Results
[14] 2019 Brazil	Integrative literature review	To identify and analyze the scientific evidence regarding the occurrence of Medical Device-Related Pressure Injuries, considering the development sites; and to describe the devices of risk and the measures of prevention and treatment	Overall measures to prevent and treat MDRIs included periodic skin assessment, repositioning of devices and use of dressings to reduce shear force. Consider the application of dressings that promote pressure redistribution and absorb body moisture in areas in contact with medical devices and fixers; apply dressings below medical devices, lift and/or move the device often to examine the skin below it and reposition for pressure relief. When repositioning does not relieve pressure, it is important not to create more pressure by placing tight bandages under and over the devices
[15] 2019 USA	Organization's process improvement model	To decrease the incidence of nasogastric tube-related hospital-acquired pressure injury	The team implemented guidelines using the simple mnemonic "CLEAN": correct tube position, stabilize tube, evaluate area under/near tube, alleviate pressure, note date and time The incidence rate of nasogastric tube-related hospital-acquired pressure injury (0.13 per 1000 patient days in 2015) decreased 100% (0.0 per 1000 patient days in 2016) after the guidelines were implemented in the organization

(continued)

Table 1. (continued)

Article/year/country	Type of Study	Objectives	Results
[16] 2021 Brazil	Descriptive and qualitative study	Understand the care implemented by the nursing team for the prevention of PU associated with medical devices in critically ill patients	Nursing care in the fixation of devices; frequent repositioning of the clients; protection and padding of body areas in contact with the devices; substitution of rigid materials for flexible materials, when possible; professionals' attention so that the devices are not under the clients; assessment and early removal of devices when clinically possible
[17] 2021 Brazil	observational, prospective, quantitative field study	To assess the occurrence of Medical Device-Related Pressure Injury (MDRPI) in an adult ICU	Among the main preventive measures, it was observed the application of gauzes on pressure points caused by respiratory devices and treatment measures such as decompression, repositioning of the device above the lesion and application of dressings for wound evolution
[18] 2021 Brazil	Delphi	Develop and validate a bundle for the prevention of pressure injuries related to medical devices in critically ill adult patients	21 priority care listed by the experts for the prevention of MDPRI are presented. This care involves handling the device, mucosal skin integrity, nutrition and mobilization of the person
[19] 2022 UK	Observational	To explore medical-device related pressure ulcers (MDRPU) in an intensive care unit (ICU) at the Royal United Hospitals Bath NHS Foundation Trust (RUH)	Measures focused on skin checking, offloading and rotation of devices, including endotracheal tubes, non-invasive ventilation, nasogastric (NG) and nasojejunal (NJ) tubes and catheters. A specific comfort and pressure care record was developed for ICU to record the assessments of these at-risk areas

The content analysis of the articles in this ScR allows us to observe that preventive measures for PU associated with medical devices include nursing care in fixing medical devices [14–19]. There is a need for planning by the interprofessional team to carefully choose the appropriate material for fixing the device [18]; if possible, replacing rigid devices with flexible devices, when available [16]; maintenance and fixation of the devices on the skin with suitable material, if necessary use devices and materials that prevent friction [14, 16, 18] or the protection and padding of body areas in contact with medical devices [16], consider the application of dressings that promote pressure redistribution and absorb body moisture in areas in contact with medical devices and fixers [14]. The positioning of the devices must be done anatomically [18], ensuring that they are not under the patients [16].

The authors recommend systematic skin assessment [14, 16, 18, 19]; with the removal of the fixation to assess the skin and early identification of possible pressure zones [16, 19]. The repositioning and/or alternation of the device insertion and fixation site [14, 16–19] are important to avoid pressure. When repositioning does not relieve pressure, it is important not to create more pressure by placing tight bandages under and over the devices [14]. In the event of erythema, reposition the device elsewhere [17].

Hygiene care and maintenance of skin hydration under and around the devices [14, 18] should be guaranteed, as well as monitoring hydration and nutrition [18].

The team should evaluate and consider early removal of devices, when clinically possible [16, 18]; draw up accurate records [18] that may include an instrument for assessing the risk of pressure associated with the presence of the devices [19].

To control this problem it is necessary to train the team [15, 16], and involve everyone. One of the studies presents a mnemonic to aid the intervention - “CLEAN”: correct tube position, stabilize tube, evaluate area under/near tube, alleviate pressure, note date and time [15] which in a creative and easy form demonstrated the promotion of team adherence to the introduction of preventive measures.

4 Discussion

In the ICU, patients have one or more medical support or intervention devices (for monitoring, respiratory support or feeding) [1–4, 16] which in themselves increase the risk of PU. For example, inadequate fixation of the nasogastric tube around the nostril quickly leads to tissue ischemia, leading to lesion formation [16].

The preventive measures identified in this ScR are in line with the recommendations of the European Pressure Ulcer Advisory Panel, National Pressure Ulcer Advisory Panel and the Pan Pacific Pressure Injury [9] namely the evaluation and selection of the device according to its ability to reduce damage, shape and size suitable for the individual and correct use and fixation of the devices; regular monitoring of the device clamping tension and the comfort of the person; frequent assessment of the skin under and around the device (looking for signs of PU); regular repositioning of the medical device avoiding pressure and twisting of the same; removal of devices as early as possible; placement of prophylactic dressings under medical devices [9].

It should be noted that despite being a common problem, with high economic translations [20, 21], organizations are not fully aware of its resolution. This statement is

supported by the fact that in many hospitals the devices and materials available are more rigid, which provides less comfort to the client and increases the probability of PU [16]. One of the sample studies presents as an example of this, the NIV face masks, which, if they were more malleable and, therefore, slightly more comfortable, would not cause so much pressure on the skin [16].

Some materials such as electrode cables, probes, tubes and caps are inadvertently left under the clients, by health professionals [16], either because of the workload, or because of the devaluation of the risk they pose to skin integrity. In preventive terms, this issue is an alert to the need to form multidisciplinary teams and develop strategies to increase the adherence of professionals to preventive measures [22, 23]. Different studies that aimed to assess pressure ulcer prevention practice among nurses revealed that PU prevention practice was not adequate [24, 25], which justifies the investment in training in the work context and in the training of nurses for the systematic introduction of preventive measures in the clinical practice [22].

A recent study conducted in China aimed to describe the level of Chinese ICU nurses' knowledge, attitudes, and self-reported practices of PI prevention concluded that mean scores of participants' knowledge, attitude, and their self-report practice were 65.82 ± 9.29 , 76.65 ± 8.62 , and 83.35 ± 13.55 , respectively [26], which leads the authors to recommend that nursing administrators explore strategies to guarantee nurses' participation and to improve training quality in order to increase training effectiveness in the future [26].

In addition to training professionals, the development of acronyms [15] or algorithms [27] can enhance the intervention of the team to solve this problem. A study aimed at developing and testing the effectiveness of an algorithm to prevent medical device-related pressure injuries in intensive care unit patients concluded that it was an effective and safe intervention that can contribute to providing a higher quality of nursing care [27].

It is recommended that future studies combine training interventions and cognitive-behavioral strategies to increase professionals' adherence to PU prevention. This ScR has limitations associated with access restrictions to the full text, in open access and in Portuguese, English and Spanish, which may have conditioned the non-inclusion of studies that answered the question. Furthermore, the assessment of the quality of the evidence was not carried out. Despite these limitations, we consider that the results are valid to be implemented in the clinical practice of nurses in intensive care, contributing to the mitigation of the incidence and prevalence of PU associated to medical devices.

5 Conclusions

Interventions for the prevention of PU associated with medical devices are clearly autonomous interventions by nurses and are based on simple, cost-effective and safe care for patients, such as: correct fixation of medical devices, frequent repositioning, protection of body areas in contact with devices, the substitution of rigid materials for flexible ones, avoidance of excessive pressure that the devices can cause and the evaluation and removal of the same as early as possible.

The curricula of nursing courses must include content related to this type of PU and organizations must invest in continuing education. As it is an indicator of the quality of nursing care and an important factor in the quality of life of clients, this need is even greater.

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Future and Present of Technology in the Elderly: Difficulties in the Process of Inclusion

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Abstract. This chapter aims to approach the relationship between technology and the elderly population, differentiating technological aspects that condition the perspective from which the problem can be approached. This classification of the different existing technologies makes it possible to go deeper into the factors that influence the approach and use of technologies by older people. Depending on the aspect to which we are referring, the factors that condition this phenomenon differ. Relevant data regarding the approach and use of technologies by this sector of the population have been extracted through reviews of articles addressing this issue. From these studies, the factors influencing this technological approach and use have been identified. In addition, it lists the most commonly used indicators for the extraction of problem-focused data. In another line of content, starting from the fact that there is an increase in the population of older people, we reflect on the importance of moving from a situation in which there is a digital divide, or rather, a technological social participation gap on the part of older people, to a social inclusion demanded by this sector of the population through the technological social sphere.

Keywords: Technology approach · Older people · Technological inclusion · Digital gap · Digital literacy

1 Introduction

Approaching the reality experienced by older people in terms of their relationship with technologies means differentiating between the Technologies of the Present, introduced for the performance of everyday actions of daily life and aimed at the entire population, and the Technologies of the Future, developed specifically for specific problems faced by this sector of the population, especially in the health and care field [7]. Among the former we can find on the one hand, the devices: mobiles, computers, tablets, cleaning robots, among others, and, on the other hand, the applications or content offered by the devices: applications for public transport, health, administration, commerce, leisure, entertainment, justice, information, communication and other essential services for the integration and participation of the population in the community. Among the latter, we

can find health innovation devices for improving quality of life and robots for healthcare applications aimed at facilitating the performance of daily activities [4]. The former is characterized by their standardized use by citizens as part of their participation in the different spheres of society and the latter are characterized by their exclusive and/or excluding use by the sector concerned. Exclusive, because it is aimed at people with specific difficulties, and exclusive, because of its innovative nature, its high cost and its unfinished creation process, which makes it accessible to a low percentage of people. In both cases there is a shift away from the elderly towards the use of technology, but the perspective from which the relationship between the elderly and technology should be studied to try to reduce the gap between the two differs depending on the technologies involved. Therefore, it is essential to consider these two technological aspects, Present and Future, to delve into the factors that influence the approach and use of older people towards the wide technological world that invades us.

One of the differences that can be highlighted between the two technologies is the adaptation of the device designs to the characteristics of the longest-lived segment of the population. The Technology of the Present does not start from designs adapted to facilitate the use by people with difficulties, even if submenus offering accessibility adaptations are hidden in its applications. However, on the contrary, these technologies are essential for accessing community services and procedures, and the difficulty that this sector of the population encounters in accessing them generates a social exclusion that deprives them of participation in some services that are essential for their daily development. Future Technologies are based on user-friendly designs and offer useful features that make everyday life in the sector easier by assisting with age-related difficulties. These factors either favor or limit an individual's approach to the use of technology.

The factors that intervene in the use and acceptance of technology are mostly associated, on the one hand, with the perception and beliefs that the individual has about this technology and, on the other hand, they are associated with the barriers between the subject and the device, which may appear at different stages of the life cycle in which an individual is, and are also influenced by the culture in which he or she lives [5].

The most standardized popular and scientific discourse found in society today is that there is a digital divide between older people and other age groups. This discourse permeates among older people and older adults, predisposing them negatively to the necessary technological approach. Thus, the feedback effect of the phenomenon appears in which the event is generating the effect and the effect is generating the event. Therefore, there is a first relational barrier that hinders the approach of the elderly to the use of technology, which must be eradicated as a prior step to the development of actions aimed at facilitating its use. If this main barrier is not taken into account before carrying out actions aimed at the transmission of knowledge for the handling and understanding of the usefulness of each technology, they will not have a lasting effect and will not achieve an autonomous result on the part of the population experiencing the digital divide or, better said, the technological social participation gap.

2 Studies on Factors Leading to Technological Rapprochement

There is a strong body of literature that outlines the factors that need to be in place for older people to approach and facilitate the use of technology. Although this literature

does not distinguish between the technological aspects proposed here and classifies them indistinctly according to the device, the application or the utility to which they are directed, it is possible to extract the factors to prioritize the elements that need to be dealt with in order to include this sector of the population in the technological sphere, which is essential for the participation of this sector in society, i.e. for their personal development.

Murciano, Martín and Torrijos [5] identify in their systematic review the main results of research focused on the use and acceptance of technology by older people during the period 2010–2020. Among these results, it can be observed that for older people to use the technologies, they have to be perceived as easy and useful, which requires appropriate design and support in their use. There is a gender difference among older people that is evident in that men perceive technologies to be more useful, enjoy using them more and perceive them to be easier to use than women. On the other hand, it was found that the elements that influence the intention of older people to use technology are habits, expectation of performance and effort, social influence, facilitating conditions, satisfaction with services, enjoyment, satisfaction with life and motivation. Older people who have the capacity for self-determination, self-confidence, self-efficacy, as well as awareness of the impact that technology has on their quality of life, facilitate the approach and acceptance of technology. They also increase the possibility of rapprochement and acceptance if older people have computer skills such as typing. Murciano, Martín and Torrijos [5] summarize results obtained from the review with respect to mobile devices in which it is observed that these devices can be used to measure the emotional support and social companionship that is offered, demanded, or required among older people. They also highlight that there is a correlation between belonging to social support networks through this device and living in loneliness. Finally, after reviewing all the selected articles, there is evidence that the use of mobile devices can cause frustration as well as satisfaction when normalization of their use is achieved.

It is relevant to highlight the indicators that have been identified in the studies reviewed on the approach and use of technology by older people carried out by Murciano, Martín and Torrijos [5]. This aspect can be useful to further analyze the reality, adding, preserving, or modifying what exists in order to reach the final objective of technological inclusion of the elderly. These indicators are shown in the following Table 1:

Therefore, favorable factors for the approach and use of technology by older people are considered to be previous positive experiences in relation to technology, the existence of conditions that facilitate these processes of approach and use, if the older person is healthy, has social support, enjoys using technology, is satisfied with the usefulness it provides, the cost of its use is not excessive and their environment has a positive influence on the generation of the approaching behavior.

Another systematic review from which data can be drawn that aims to identify and examine the scientific evidence on digital skills in older adults is Benavides and Chipana [1]. It can be seen from the results identified that there is an increase in the older population demanding e-inclusion. In addition, this population is more likely to use media and technological resources if they have access to the internet, as it promotes information and communication opportunities and optimizes healthy living and active ageing habits. It is pointed out that existing laws, plans, and digital agendas aimed at

Table 1. Own elaboration. Indicators on the use of and approach to Technology by older people

INDICATORS ON THE USE OF AND APPROACH TO TECHNOLOGY BY OLDER PEOPLE
The Technology Experience
Enabling Conditions
Health
Social Support
Emotions
Perceived Enjoyment
Satisfaction
Technology Anxiety
Perceived Risk
Motivation
Cost
Subjective Norm
Social Influence

favoring the use of digital technology by older people do not guarantee their inclusion in society, taking into account that this society is governed by technological functioning. Finally, it is pointed out that this sector of the population does not have the basic skills to access the public system, which are essential for administrative procedures, although there is a high percentage of older people or older adults who agree to participate in technological teaching-learning processes. Therefore, according to the authors, it is necessary for the State to implement effective public policies to favor the approach and use of technology [1].

On the other hand, data have been obtained on the most studied devices and applications in the scientific field with respect to the elderly. In a bibliographic review carried out by García and Jordán [3] on the technological applications that are developed for the benefit of the elderly, it was found that the most researched devices to facilitate the independent life of the elderly are robots, apps, tablets, mobiles, computers and, to a lesser extent, activity bracelets, virtual reality glasses and smart scales [3].

It is also observed that 56% of the older people studied in the studies selected for this review perceive the technologies as totally effective and the remaining 44% perceive them as partially effective [3].

With regard to the intended application of the devices used by the older people studied in this research, 58% are used for Instrumental Activities of Daily Living (IADLs), 26% for Basic Activities of Daily Living (BADLs), 13% for social participation and 3% for play [3].

3 From Digital Divide to Technological Inclusion

From the data extracted from the scientific literature focused on the approach and use of technology by the elderly, it can be concluded that technology can be a tool that benefits the quality of life of the elderly while at the same time it is considered a factor of social exclusion. There is therefore a perception barrier that makes it difficult for this population to approach technology and a need for present-day technology to adapt to the characteristics of its older users. On the other hand, it is essential for the State to develop measures to develop initiatives that facilitate the disappearance of this perception barrier and thus favor rapprochement by encouraging the development of devices adapted to the specific characteristics of the elderly.

The population of older people living alongside other age groups today are digital immigrants [6], as they have had no contact with technology in their previous life stages. The physical barriers of age (developed by Future Technologies) are not the only impediment that hinders the approach to the digital world by the elderly, but there are also psychological barriers that appear as a consequence of the effect that is generated in the first encounter with this element, since this is when they begin to experience not only physical, but also mental and emotional decadence, the latter fostered in part by the lack of social participation generated mainly by technological remoteness. These barriers created by customs, measures and habits of the past are now being addressed by promoting active ageing and healthy habits from the earliest stages of life. However, there is still a high percentage of people, especially in rural areas [4], who have to make this change of perception towards technology and adaptation to the wider technological environment in one of the stages of life in which change itself is perceived as a complicated process at best and as an unattainable process at worst.

Another axis that underpins the technological problem in the elderly is that the effort to teach and bring technology and new social processes to the elderly is left in the hands of their relatives or closest environment. As it has been observed, the social support factor is favorable to the approach and use of technology, but this factor needs to be accompanied by the other key favorable elements: the adaptation of devices and contents and the development and implementation of initiatives that bring technology closer to the elderly person in this order of relationship.

For this reason, not only physical barriers must be broken by adapting devices to the characteristics or difficulties of the age group, but also generational barriers, adapting the content so that it includes language with clear, concrete, concise indications, offering explanations that can be easily understood, vocabulary and visual elements that facilitate the use and access to each content and thus, in this way, produce a technological inclusion starting from the design and development of devices and content that are based on adaptation to the characteristics of the elderly. Mobile devices, tablets, computers, mice, keyboards, speakers, headsets, microphones, screens, televisions, etc., designed with elements that break down the lack of coordination, vision, hearing, etc. Contents of applications and digital procedures that break the lack of understanding, that speed up the process and that use simple, eye-catching, concrete elements. In short, adapted to their characteristics, because the process of reverse adaptation, i.e., from older people to the characteristics of the devices and content, is neither effective nor inclusive.

In order for this process of technological inclusion to take place, it is necessary to develop and implement measures that encourage, promote and value the design of inclusive technological devices and content, which favour a technological approach from an initiative that welcomes new inclusive devices and content and takes them directly to the person who has not made this approach and therefore experiences social exclusion [2]. Initiatives that focus, first of all, on the creation of new devices and content, and then on breaking down the negative perception established among this population by making the elderly aware of the positive impact of technologies on their lives, in order to then offer them training that creates satisfactory experiences in which knowledge of their use and usefulness is transmitted, covering their real demands.

Most of the efforts towards this technological adaptation of devices and content to the characteristics of the elderly are being made mainly in Future Technology, which, as we said at the beginning of the chapter, is focused on the health and care field and access is very limited, which means that its use is privileged. Therefore, it is the Technology of the Present that is focused on the development of social processes and that generates this gap in social participation. Therefore, measures aimed at technological inclusion should primarily address this aspect of technology.

4 Technological Inclusion Initiative for the Elderly

In order to summarize what has been seen so far, we will reflect on the characteristics that should be concentrated within an initiative that aims to achieve the technological inclusion of older people according to the issues analyzed in this chapter for a full social participation from all the areas that converge in this structural framework. The areas covered in this chapter are public transport, health, administration, commerce, leisure and entertainment, justice, information, and communication. As a first phase within an initiative for the inclusion of the Technology of the Present, a first block of actions would be developed aimed at regulating laws and creating aids focused on each of these areas of citizen participation that promote updates to the content of the services they offer in order to break with the difficulties of access and use faced by older people. The data on these difficulties can be extracted from awareness-raising campaigns for this population in which the impact that technology has on people's quality of life is conveyed, breaking down prejudices and thus facilitating technological rapprochement. In addition, discussion groups could be held to analyze the real difficulties encountered when confronted with the different applications in each area of technological participation.

This is time-consuming and costly work, as it requires a high degree of involvement of the elderly and all elements of each application would have to be assessed. But the result would be the demolition of a large concrete wall that has not been taken into consideration. If this wall is not demolished, it is unlikely that there will be effective inclusion of the older population suffering from this technological social participation gap, which is the basis of this problem. Two distinct fields of action should be distinguished, which are necessary to compare and identify a broad spectrum of difficulties: the urban area and the rural area.

At the same time as the actions to collect data on the difficulties in using the contents of the services and awareness-raising to dilute prejudices are carried out, the actions of

the second axis of this first block of the initiative could be carried out. These actions would be designed to encourage, in the same way as in the previous axis, the innovative development of technology that breaks down physical age barriers through grants, prizes and other actions that promote technological progress in this respect. It would be essential, within this block of actions, to encourage, through advertising campaigns or economic aid to this sector of the population, among other actions, the need for internet connection at home, as this is also seen as a factor that hinders rapprochement.

As the third axis of this first block that supports the initiative for the technological inclusion of the elderly, studies should be carried out focused on reaching the highest possible percentage of the elderly population with digital literacy programs. Case studies should be carried out in each community to approach each reality and take its peculiarities as a starting point. Generalized programs only reach a specific profile of older people that could well be analyzed to identify the reasons why they do not extend to the whole wide range of people who coexist in this sector of the population.

Once this first phase was completed, we would move on to the second phase in which we would develop a block of actions aimed at the physical approach and the transmission of "technological know-how". This would be carried out by putting into practice the findings obtained through the preliminary studies for the satisfactory establishment of a relationship between the elderly and technology. Technology, now adapted to obtain a pleasurable sensation during its learning and use.

In the following table we can see the elements that make up this model of initiative towards the technological inclusion of the elderly population. It distinguishes the different phases, blocks, actions, objectives, and fields of action that are developed Tables 2 and 3.

New digital literacy programs designed to break down barriers to reach and create positive experiences of older people with technology could be designed with a focus on achieving the learning objectives shown below:

- Knowing how to differentiate between the Technologies of the Present and the Technologies of the Future.
- To know the services offered by the different areas of technological social participation.
- To learn the usefulness of the services offered by the different areas of technological social participation.
- To learn about the impact of technological services on quality of life.
- Identify the different devices adapted to their characteristics.
- To learn the differences and similarities of the various devices in relation to the services offered by the different areas of participation.
- To learn how to use the device.
- To learn how to navigate through the content of the technological service.
- Increase self-determination, self-confidence, self-efficacy in relation to the use and understanding of the device and technological content.
- Encourage the use of applications for healthy habits and active ageing.
- To train safe use against possible frauds.
- To know the most relevant digital administrative processes according to the characteristics of each user.

Table 2. Own elaboration. Technology inclusion initiative Third Age. Stage 1

TECHNOLOGY INCLUSION INITIATIVE. THIRD AGE			
STAGE 1			
BLOCKS	ACTIONS	OBJECTIVES	FIELD OF ACTION
BLOCK 1	Actions towards the updating of content	Regulating legislation	The State and Autonomies
		Create grants	The State and Autonomies
		Extract data on difficulties using app	Urban and Rural Areas
	Cross-cutting actions	Raising awareness and eliminating prejudices	Urban and Rural Areas
BLOCK 2	Actions towards the promotion of adaptive innovation of the Technology of the Present to the characteristics of the elderly	Regulating legislation	The State and Autonomies
		Create grants	
		Create scholarships, awards	The State, Autonomies, and Institutions
		Promote specific technological development	
	Actions towards facilitating Internet access for the elderly	Advertising Campaigns	The State, Autonomies, and Institutions
		Create Financial Aid	
Raising awareness and eliminating prejudices			
BLOCK 3	Actions towards awareness of the scope of digital literacy programmes	Conduct community case studies	Urban and Rural Areas
		Conduct user profile studies	
		Identify causes of the programme's scope	Institutions

One might ask whether it is possible to do this work. In my opinion, it is. It needs professionals, it needs time, it needs funding, it needs implementation, it is tangible, and it is relevant. But is it a priority, is it a momentary situation, or will there always be technological immigrants in the technologically drifting world?

Table 3. Own elaboration. Technology inclusion initiative. Third Age. Stage 2

TECHNOLOGY INCLUSION INITIATIVE. THIRD AGE			
STAGE 2			
BLOCKS	ACTIONS	OBJECTIVES	FIELD OF ACTION
BLOCK 1	Actions towards the physical approach and the transmission of “Technological know-how”	Launching new digital literacy programs	Autonomies
		Assessment of scope and objectives	Digital literacy program
		Improvement analysis	Digital literacy program

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Individual Cognitive Stimulation in People with Dementia: Good Practices

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Abstract. Background: Cognitive stimulation (CS) focuses on the intellectual and social stimulation of people with neurocognitive disorders (NCD or dementia). This intervention is widely disseminated in group settings and may not be accessible or adequate to all people with cognitive impairment. *Making a Difference 3 (MD3)* is an individual CS program in which family (informal) caregivers play the role of home care partners. These individual CS programs should be conducted based on key principles (good practices). **Aim:** To outline a set of good practices that should be adopted during the implementation of individual CS programs by caregivers. **Methodology:** Three main activities were conducted: i) Systematic review of the literature; ii) Translation and cultural adaptation of the MD3 to European Portuguese; iii) Randomized clinical trial with 52 dyads (caregiver and person with dementia) to assess the effectiveness of MD3 and its acceptability and applicability by older adults with dementia and their caregivers. **Results:** Thirteen good practices were outlined based on the values of respect, involvement, dignity, freedom of opinion and choice, understanding, tolerance, and cooperation with older adults with dementia. **Conclusion:** Several good practices were identified for the implementation of individual CS programs by caregivers of older adults with dementia. The healthcare professionals and experts in dementia care and the caregivers considered the recommended practices informative, inclusive, and valuable.

Keywords: Aged · Cognition · Dementia · Cognitive stimulation · Neurocognitive disorders

1 Introduction

Population aging is associated with an increase in the prevalence of major neurocognitive disorders [1, 2], usually referred to in the literature as dementia. There are over 50 million people diagnosed with dementia worldwide, and this number is estimated to rise to 152

million by 2050 [3]. The annual economic impact of dementia is estimated at US\$ 1 trillion and is expected to double by 2030 [3].

Older adults with dementia require care that attends to their physical needs but also their psychological and social needs. This paradigm of care aims at increasing their potential for self-care and autonomy, involving and supporting the family, and promoting psychosocial activities [4].

Cognitive Stimulation (CS) is an approach that focuses on intellectual and social stimulation through relevant activities and discussions [5–7]. It aims to improve several domains, such as concentration, thought, memory, and language. There is evidence supporting the effectiveness of CS in improving cognition, mood, well-being, functional activity, quality of life (QoL), and communicational skills, as well as in the consumption of human and economic resources [8–11].

Regardless of the intervention context, the facilitator of CS sessions (group leader/health professional) should be sensitive to the multiple needs of older adults with dementia, take a flexible approach, and adapt the content, order, and structure of the sessions when necessary. Adopting well-defined good practices throughout the various sessions is crucial for the implementation and effectiveness of CS programs [12]. This study aimed to identify a set of good practices to be applied by informal caregivers in individual CS sessions with older adults with dementia.

Dementia is a clinical syndrome caused by neurodegeneration resulting from diseases including Alzheimer's disease, frontotemporal dementia, and Lewy body dementia [1]. It is characterized by changes in specific cognitive domains such as attention, executive function, learning ability, memory, language, motor perception, and social cognition and tends to interfere with individual autonomy [1].

In addition to the loss of cognitive skills, other domains are affected, such as the socialization process, with people with dementia often losing their social functions, such as their family or professional roles. Thus, older adults with dementia can be profoundly affected by a set of limitations usually imposed by third parties, which further affect their learning ability, self-esteem, and relationship skills [13]. In the care relationship, the skills of older adults with dementia are usually not strengthened, and they are deprived of their personality and identity [13]. The dialectics of the socialization process of older adults with dementia has been studied. Kitwood (1990) argued that the interaction with this group reverted into a dynamic similar to the biomedical paradigm, centered on the repercussions of the neuropathological mechanisms of the disease, with a negative impact on care delivery [14]. Therefore, the author introduced the need to share his view among professionals, caregivers, and family members of older adults with dementia, based on the assumption that human beings are deeply affected by the social psychology that surrounds them.

In this theoretical framework, self-esteem is essential for good learning, efficacy, and constructive relationships with others [14]. Conversely, when self-esteem is absent or deteriorated, the person is incapacitated, falling into a cycle of discouragement and failure [13, 14]. Thus, Kitwood [14] identified ten 'malignant' processes and interactions that tend to depersonalize older adults with dementia: a) treachery, dishonest representation used so that older adults with dementia fulfill the wishes of third parties; b) disempowerment, although the person is able to perform a particular activity with more difficulties or

slowly, the activity is performed by another person; c) infantilism, where it is implicitly or explicitly reinforced that older adults with dementia have the skills and the mentality of a child; d) intimidation, where a sense of fear is infused into the older adults with dementia, in some cases being on the receiving end of behaviors such as threatening or even physical aggression; e) labeling, where the diagnosis is associated with decline and consequent progressive disturbance, resulting in a misrepresentation of how the person is treated subsequently; f) stigmatization, similar to the concept of labeling, although it is associated with connotations of social exclusion; g) outpacing, in terms of the rhythm of completion of daily activities, where older adults with dementia are denied their own rhythm, usually slower than before; h) invalidation, when experiences and emotions are forgotten or neglected; i) banishment, when the person is seen by others as somehow intolerable, being physically or psychologically deprived of sustainable human contact; and j) objectification, when older adults with dementia stop being treated as a person and are perceived merely as an empty body.

In this context, health professionals must recognize the specific needs of older adults with dementia and their caregivers, which can vary according to aspects such as family typology, gender, ethnicity, age, religion, and beliefs. For the World Health Organization (WHO, 2015), identifying the most effective interventions for educating, training, and supporting formal and informal caregivers of older adults with dementia is a priority [15]. Thus, the effectiveness of interventions in improving the cognition, social functioning, and QoL of people with dementia should be analyzed, constituting a challenge for current health systems.

In the literature, non-pharmacological interventions emerge as additional strategies for addressing the complexities inherent to the human responses of people with dementia [16]. These non-pharmacological interventions include a set of approaches, such as multisensory stimulation, cognitive rehabilitation, massage, touch, and validation therapy [16, 17]. In this perspective, CS stands out in the context of dementia.

The results suggest that CS is associated with a lower risk of cognitive impairment and should start as soon as possible [18]. CS increases cognitive reserves, protecting against decline, delaying its onset, and causing dependence and inability to self-care [8, 19, 20].

CS is traditionally implemented in group settings, involving the presence of a health professional who conducts scheduled thematic sessions in an institutional context such as hospitals, community rehabilitation units, nursing homes, or day centers [5, 20, 21].

Structured and replicable CS programs have been designed, such as the Making a Difference: An Evidence-Based Group Program to Offer Cognitive Stimulation Therapy (MD)[22] and the Making a Difference 2: An Evidence-Based Group Program to Offer Maintenance Cognitive Stimulation Therapy (MD2)[18]. These programs are designed to assist health professionals and formal caregivers in the context of group CS.

Despite the increasing number of CS groups, these may not be accessible or suitable for all older adults with dementia. Factors such as the lack of these interventions in local institutions, difficulties accessing these groups, comorbidities, mobility restrictions, and reduced interaction in group activities may constitute barriers to the application of these interventions. Thus, the Making a Difference 3 - Individual Cognitive Stimulation Therapy: A manual for caregivers (MD3) was developed to provide other forms of access

to CS [23], where informal caregivers play the role of care partners in a home context [6, 23]. However, during the development of the program, it became necessary to outline a set of good practices that guide informal caregivers during individual CS sessions, tailoring the interventions to the reality of older adults with dementia.

Therefore, the following research question was investigated: Which good practices should be adopted by health professionals and informal caregivers of older adults with dementia during the implementation of individual CS programs?

2 Methods

Three main tasks were undertaken: i) A systematic review of the literature (SRL) on the effectiveness of individual CS interventions; ii) Translation and validation of an individual CS program (MD3) for the Portuguese population; iii) A randomized clinical trial (RCT) with 52 dyads (caregiver and older adult) to assess the effectiveness of MD3 and its acceptability and applicability by older adults with dementia and their caregivers.

2.1 Task 1 - Systematic Review on Effectiveness of Individual CS

A SRL on effectiveness was developed in three stages according to the methodology proposed by the JBI [24, 25]. First, using a combination of keywords and index terms, published studies were identified and screened for eligibility by two independent reviewers. Then, after screening the studies against the inclusion criteria, potentially eligible articles were selected and their methodological quality was appraised. Finally, two independent reviewers extracted, assessed, and synthesized data from the included studies [11, 26].

2.2 Task 2 - Translation and Validation of the Making a Difference 3

The MD3 program is an innovative individual CS approach designed to be delivered by caregivers three times a week, in a total of 75 sessions, with the supervision of a health professional [23], and was developed by Yates, Orrell, Phoung, et al. (2015). Its translation and adaptation into European Portuguese followed the phases recommended by the Formative Method for Adapting Psychotherapy (FMAP) [27] and the guidelines for adapting cognitive stimulation [28]. Several activities were carried out, namely: i) initial semi-structured interviews with stakeholders, such as caregivers ($n = 2$), health-care professionals ($n = 3$), and academics ($n = 3$); ii) a panel of experts in dementia care ($n = 8$); and iii) focus groups with caregivers of older adults with dementia ($n = 10$) [29].

2.3 Task 3 - Randomized Clinical Trial

The RCT followed the CONSORT (Consolidated Standards of Reporting Trials) guidelines in order to ensure the highest quality of its report. [30] A 12-week two-arm RCT was conducted (individual CS program -MD3 versus control group). The intervention focused on older adults with dementia who lived in their homes ($n = 52$) and was applied by their caregivers ($n = 52$). Semi-structured interviews were conducted with four participants who completed the RCT [31, 32].

3 Results

In Task 1 (SRL) [11, 26] aimed to identify the most effective individual CS interventions or programs, two studies stood out by the number of positive effects. Quayhagen and colleagues [33] examined the impact of CS and found positive effects on cognitive functioning, particularly memory, attention, and verbal fluency. Similar results were obtained by Davis and associates [34], who found significant post-intervention changes in older adults' memory, attention, and verbal fluency [34]. Both programs were very well structured [33, 34]. The cognitive intervention [34] conducted by the caregiver focuses on the attention process and uses different activities, such as multisensory, leisure, and memory-recalling activities. In addition to home-based exercises six days a week, the dyads had weekly contact with healthcare professionals who also performed a one-hour intervention [34]. Healthcare professionals focused on different skills through exercises of face-name association and space retrieval, along with a discussion of older adults' topics of interest [34]. Another intervention [33] focused on memory (assimilations, rehearsal, elaboration, and consolidation), problem-solving, and dialog (social interaction using observational learning and participant modeling) [33]. All participants included in the treatment group received weekly training visits by members of the research team, who trained older adults with dementia and their caregivers in the implementation of CS activities. The caregivers were also asked to demonstrate the techniques learned, consolidating the recently acquired knowledge [33].

Both programs have some aspects in common. They were applied by caregivers six days per week. Formal moments of guidance, training, and supervision were well structured. Moreover, weekly support was provided by healthcare professionals to caregivers [33, 34]. Both studies used different strategies to strengthen the bond between dyads and healthcare professionals [33, 34]. In one study, healthcare professionals' attendance was weekly, and, during these meetings, new guidelines and support were provided to the caregivers [33]. Moreover, each week, the caregivers were required to fill out a compliance sheet with the time spent on the CS exercises. In the other study, the research team members supervised the home sessions [33]. The caregivers also provided weekly feedback on successes and challenges faced during the implementation of the program, as well as the time spent on the CS exercises.

The introductory chapter of the MD3 [23, 35] highlights 13 key principles that aim to assist the caregiver in the implementation of individual CS sessions. The stakeholders (caregivers, health professionals) valued these principles in all stages of the process (translation and adaptation) and reported that they should be discussed in detail with caregiver during their training and before starting the individual CS sessions [29]. So, caregivers should be aware of the importance of:

- **Mind stimulation.** The main purpose of CS is to activate and engage the mind, offering the possibility of performing stimulating activities.
- **Developing new ideas, thoughts, and associations.** Communication with older adults with dementia tends to focus on past information, which may be “over-rehearsed” and less stimulating. CS programs use techniques that encourage people to use their knowledge to think about things in new ways.

- **Using orientation in a sensitive manner.** Orientation is an important goal of CS programs, but how older adults with dementia are oriented is crucial. Asking direct questions to the person can be demoralizing. For that reason, orientation should be used subtly and implicitly at the beginning of each session, for example, through a conversation about political parties and important dates.
- **Focusing on opinions, rather than facts, to enhance one’s strengths.** If we ask people for their opinions, moving away from the right or wrong dualism inherent to facts, we may get amusing, sad, unusual, controversial, or intriguing answers, but they are not wrong.
- **Using reminiscence as an aid to the “here” and “now”.** Using memories can be useful and fun during CS sessions. Reminiscence can be used to celebrate the family life, personality, career path, hobbies, and achievements of older adults with dementia. Reminiscence can also be useful for orientation, especially in comparing old and new activities.
- **Providing triggers to support memory.** Memory improves when in contact with several senses. So, CS sessions should include activities that simultaneously trigger vision, hearing, smell, taste, and touch.
- **Stimulate language and communication.** There is evidence that communicational skills improve when a person engages in stimulating activities.
- **Stimulate everyday planning ability.** The ability to plan, organize, and sequence, also known as executive functioning skills, is usually impaired in older adults with dementia. In both CS programs, the sessions promote the discussion and implementation of activities in this area to encourage the person to use these tools again.
- **Using a person-centered approach.** In this approach, the person’s unique qualities are determined by their life history. The experiences that have shaped their personality and attitudes lead to a variety of abilities, interests, and preferences. Individual CS intends to provide a set of pleasant, showing respect to the person valuing the diversity of their opinions and beliefs, thus allowing each person to be different.
- **Offering a choice of activities.** MD3 sessions offer the person a set of alternative activities if those described do not match their preferences. Offering alternative activities allows older adults with dementia to become involved in the program.
- **Enjoyment and fun.** CS program activities should be provided in a fun and enjoyable learning atmosphere for the person to feel enabled and empowered.
- **Maximizing potential.** There is evidence that older adults with dementia can learn with the right encouragement and support. A crucial aspect is the reconstruction of a person’s memory and cognitive skills by allowing them to train these skills. This involves giving the person time to complete the proposed activities at their own pace rather than passively achieving their potential.
- **Strengthening the relationship by spending quality time together.** The individual CS program allows family and friends to be involved in the therapeutic process, focusing on the quality and fun of interacting with older adults with dementia [23, 29, 32].

During Task 3 (RCT), the research team concluded that caregiver (or, to some extent, dyad) training is essential to the success of the intervention, improving acceptance and

adherence to the intervention. Thus, the caregiver (or dyad) pre-program training should adopt the good practices described below [29, 31, 32].

The first step is to assess the quality of the dyad's relationship (from each member's perspective), as well as their literacy level and motivation to participate in the intervention. Before the implementation of individual CS, the caregiver and the older adult should be provided with: i) a theoretical explanation of the known benefits of CS; ii) the 13 key principles to be implemented during the sessions; iii) the structure and organization of each session; iv) optimal time per session; and v) weekly frequency. Caregivers should be allowed to conduct a mock session in a private environment to identify potential challenges in its application in a home-based setting. The manual for caregivers should be available in printed and digital format, and caregivers should be encouraged to read it to clarify doubts before starting the program.

Then, healthcare professionals should observe/supervise the first sessions conducted by the caregivers to assess their ability to autonomously implement the program based on the key principles outlined in the manual's introductory chapter. After each session, constructive feedback should be given to the caregiver and the older adult. Although early supervision is highly recommended, healthcare professionals should visit the dyad throughout different sessions of these programs, such as the MD3 or another well-structured program translated and adapted to European Portuguese [29].

4 Discussion

Due to population dynamics, citizens should be increasingly involved in care delivery as active care agents [11, 29, 33]. Thus, training caregivers of older adults with dementia in the implementation of CS interventions is an appropriate strategy with therapeutic benefits.

Making a CS program like the MD3 [23, 33] available means providing an opportunity to implement person-centered care and enhance the ability of older adults with dementia to make decisions in partnership with their caregivers. On the other hand, the development of CS activities highlights older adults' life stories, focuses on their tastes and preferences, and creates an opportunity for their personalities to shine. Thus, the healthcare professionals and the caregivers promote the individuality of the older person with dementia as a result of the holistic care and tailored activities offered by well-structured CS programs such as the MD3. One of the concerns with this intervention is the increase in caregiver's burden and the deterioration of their health status and the quality of the dyad's relationship. However, in this study and other studies by Yates [23] and Silva [29], no negative effects were identified for caregivers. On the contrary, Yates and colleagues reported an improvement in the quality of the dyad's relationship [23]. Therefore, healthcare professionals should be aware of the good clinical practices outlined in this study to ensure that individual CS is delivered by the caregiver in a harmonious, engaging, and therapeutic way [29].

Healthcare professionals should assess the incidence of cognitive deterioration in older adults to make an early diagnosis and apply non-pharmacological and pharmacological strategies in the early stages of the disease. At the same time, older adults (when the clinical condition allows it) and their caregivers and/or family members should be aware of the need to play an active role throughout the disease process.

Healthcare professionals, namely nurses, should play a crucial role in training and empowering caregivers and closely supervise and support the dyad during the program, ensuring positive outcomes.

5 Conclusion

Individual CS provided by a caregiver to older adults with dementia is an innovative and useful approach that can be implemented in community settings. The development, implementation, and assessment of individual CS programs should be based on a set of good practices that value the respect, involvement, dignity, freedom of opinion and choice, understanding, tolerance, and cooperation with the older adults with dementia. These good practices can assist and empower caregiver (or dyads) to actively implement individual CS programs, increasing the effectiveness of the intervention.

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Effects of Telemonitoring in Adult Heart Failure Patients on Self-care and Quality of Life: A Systematic Review Protocol

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Abstract. Introduction: Heart failure (HF) is a serious public health problem that affects many individuals and is associated with high mortality and multi-morbidity. It is estimated that the prevalence of heart failure in mainland Portugal will increase by 30% in 2035 and 33% in 2060. Home care for people with heart failure using monitoring devices and/or integrated into telemonitoring programs has been the object of research by the scientific community in health.

Objective: We aim to identify and analyze if the implementation of a telemonitoring program contributes to self-care and quality life in management of the clinical situation. **Methods and analysis:** This is a systematic literature review protocol. The search will be carried out in the following databases CINAHL Complete, MEDLINE Complete, Nursing & Allied Health Collection: Comprehensive, Cochrane Central Register of Controlled Trials, Cochrane Database of Systematic Reviews, Cochrane Methodology Register, Library, Information Science & Technology Abstracts, MedicLatina, Cochrane Clinical Answers The research strategy contains the following terms MeSH or similar. Two independent revisers will perform the inclusion and exclusion criteria analysis, the quality analysis of the data, and its extraction for synthesis. Disagreements will be resolved by a third revisor. Studies using telemonitoring intervention strategies in patients with heart failure at home and what is the relationship with self-care and quality of life of the person will be included.

Keywords: Self-care · Quality of Life · Heart Failure · Telemonitoring

1 Introduction

Heart failure affects about 1–2% of the world’s population and 6–10% of individuals over 65 years of age [1, 2]. These data are convergent with other studies that report that the prevalence of the disease varies between 1.5% and 4% of the population in developed countries [3]. The report “Portugal - Cardio and cerebrovascular diseases in numbers 2015” indicates that heart failure is the second disease with the highest number

of hospitalizations in our country [4]. Due to decompensation of heart failure, about 25% of people end up dying and about 40% are readmitted to hospital units at least once a year [5]. The key to avoiding decompensation of the disease, involves recognizing the signs of clinical deterioration, often with monitoring by a healthcare team [6]. They point out that the interventions of professionals in education, health promotion and self-care are fundamental for the person to develop the ability to manage their own disease at home [7].

Thus, self-care is a process of maintaining the patient's health, through its promotion and management of the clinical condition, and is an excellent tool which allows for a more adequate management of this chronic disease [8]. The nurses' contribution to the promotion and maintenance of self-care should be well planned and implemented, with greater importance in periods of greater vulnerability.[9] The experiences with the disease, the way it manifests itself and how it develops are a complex management process that influences the patient's life and quality of life. It is essential to develop health strategies that seek to mitigate the effects that this chronic disease causes. Home care associated with telemonitoring programs may be strategies to consider. [8].

Home care is a form of intervention in chronic disease management, integrating patient-centered nursing care, ensuring continuity of support and is one of the most significant aspects in the care needs of patients/families with heart failure [10]. The implementation of digital health programs, as an innovative and global strategy, is recommended by the WHO [11]. Telemonitoring is a tool with high potential, it is defined as the use of technologies to perform person monitoring remotely. The use of telemonitoring data is important for the patient's own use in maintaining self-care or through the integration of the care process defined by the healthcare team. [8, 12, 13, 13].

The subject has been studied by several authors, but there still seem to be some gaps in knowledge. This systematic literature review aims to identify whether the health care provided to patients with heart failure integrated in telemonitoring programs interferes with the patient's self-care ability and quality of life [14–18].

2 Objective

We aim to identify and analyze if the implementation of a telemonitoring program contributes to self-care and management of the clinical situation.

3 Review Question

What are the health gains in terms of promoting self-care behavior, resulting from the use of a telemonitoring device (for a period of 0 to 6 months), for people with heart failure at home?

4 Methods and Analysis

This protocol was developed according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) Protocols Statement [18] It was registered with

the International Prospective Register of Systematic Reviews PROSPERO registration number: CRD42022303773.

We chose to include in this review, studies conducted with resources using quantitative, qualitative, mixed methodologies and theoretical approaches.

This protocol was developed in July 2022, and it is intended that the respective review be completed by the end of January 2023.

4.1 Eligibility Criteria

The way to guarantee the rigor and systematization specific to this type of study, eligibility criteria were defined as follows.

Population

The population included in the study will be adults diagnosed with heart failure who participate in a telemonitoring program.

Intervention

The current literature review will include studies on: (i) the assessment of self-care of people diagnosed with heart failure integrated in a telemonitoring program; (ii) the assessment of the quality of life of people diagnosed with heart failure integrated in a telemonitoring program.

Comparison

Studies with or without comparative groups will be included in this review.

Primary Outcome

The main outcomes considered in this review will be the level of self-care and quality of life of patients with heart failure integrated in a telemonitoring program.

Secondary Outcomes

Secondary outcomes are related to disease management as reflected by number of emergency department visits and number of hospital admissions for disease decompensation.

Study Design

This systematic review shall include empiric quantitative observational or experimental primary studies.

4.2 Search Strategy

Data Sources

In the research strategy, it is intended to carry out a comprehensive bibliographic search and the databases to be consulted will be: CINAHL Complete, MEDLINE Complete, Nursing & Allied Health Collection: Comprehensive, Cochrane Central Register of Controlled Trials, Cochrane Database of Systematic Reviews, Cochrane Methodology

Register, Library, Information Science & Technology Abstracts, MedicLatina, Cochrane Clinical Answers.

Search Terms

The research will include the combination of four key concepts according to Medical Subject Headings (MeSH). In this case, the search phrase could be the following: Self-care AND quality of life AND heart failure AND Telemonitoring. Other keywords can also be used if necessary, such as patient e-health, domiciliary care.

The research strategy will be adapted in accordance with each data bank and will be restricted to the last 5 years, i.e., from 2017 to July 2022 in the English, Portuguese and Spanish.

4.3 Data Collection and Analysis

Studies Selection

The following study of research in each database will be exported into Mendeley and the duplicates will be removed. To minimize bias, two reviewers will independently assess the inclusion of the studies by reading the title, abstracts, and keywords and excluding those that do not fit the inclusion criteria in this review. The third reviewer should be consulted in case of disagreements or doubts. Afterward, we proceed to the assessment of the complete texts. To present this selection process, the PRISMA flowchart will be presented with the triage results in its different stages.

Data Extraction

After electronic searching, the records will be moved to EndNote software and the duplicated articles will be excluded automatically and we will remove them manually as well. Titles and abstracts of studies retrieved will be screened independently by two review authors to identify studies that potentially meet the inclusion criteria outlined above. The full text of these potentially eligible studies will be retrieved and independently assessed for eligibility by four review team members. Any disagreement between them over the eligibility of studies will be discussed until you reach consensus. A flow diagram will be used to summarize the study selection process.

Strategy for Data Synthesis

Since it is a systematic review that will include studies with different methodologies, the synthesis and analysis of the results will be narrative in nature, structured to answer the research question posed.

Ethics and Dissemination

Since only the data considered secondary will be analyzed, the ethical approval of this study is not necessary. This scientific paper is a systematic review protocol, in which the data has not yet been extracted or analyzed. The results will be disseminated through publications subject to peer review.

5 Discussion

The research carried out in self-care and quality of life in patients with heart failure has been increasing. Technological development allows for the use of increasingly sophisticated devices that provide support and assistance to people with heart failure.

The studies published do not always show the relationship between disease management through the ability of self-care with telemonitoring support, and how this process influences quality of life. With the development of this protocol, we intend to ensure the accuracy, clarity, and quality of the process so that it is systematic.

Study Limitations

The review will only include studies with quantitative methodology. The languages of research will be English, Portuguese and Spanish.

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Perception of the Population over 64 Years of Age Against the Use of Aromatherapy Devices

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Abstract. Despite the weight they're getting in recent years, it should be said that Spain is still in the tail of many European countries concerning the frequency with which people over 65 are connected to the Internet regularly and the possibility of using everything that new technologies offer. Some patients understand aromatherapy as a complementary medicine according to their values, beliefs on the nature of life, and spirituality. An observational study with control a group had carried out. The total sample included 23 participants from senior recovery centres during the months of September to October in Extremadura. There is no meaningful evidence that the study population sees new technologies as a tool for staying at home. No meaningful data exist to establish a link between the use of technological devices and the quality of sleep. The sample was poor and comfortable.

Keywords: Aromatherapy · New technology · Sleep · Quality of life

1 Introduction

The rate of ageing is growing exponentially. The proportion of people over 60 is expected to double by 2050 [1]. This situation has become a challenge for Governments and institutions, obliging them to adopt sensible measures to address the effects of population growth and prepare for future needs with institutional, social, and economic solutions [2]. Every human being is subject to changes throughout life, and old age is one more stage in the process. That is, old age does not necessarily imply a break in time or entry into a terminal stage but is part of a process in which the individual continues to be integrated into society, just as he does in earlier stages he would not have, by definition, the reason to be a stage of social exclusion [2].

E. García-Alonso, C. Galán-de Isla and J. Gómez-Raja—Contributed Equally to this work.

We can understand ageing from different dimensions. On the one hand, biological ageing is the consequence of the accumulation of molecular and cellular damage over time, leading to a gradual decrease in physical and mental capacities and an increase in the risk of disease and death. However, these changes are not linear or uniform. Another dimension of ageing is associated with social and cultural transitions in life, such as retirement, moving to more appropriate housing, and the death of friends and partners. It is essential to consider those elements that mitigate the losses associated with old age and those that can reinforce recovery, adaptation, and psychosocial growth [1].

The population is ageing. It is a fact, however, to this reality must be added the exponential and rapid advancement of new technologies in our daily lives [3]. They are breaking a spear in favour of new forms of treatment and intervention and considering them a beneficial tool for people over 65 years of age to age actively. Digitization and automation have brought about a profound revolution, mainly characterized by the emergence of multimedia devices and a spectacular expansion of networks. The processing speed of information is constantly growing, with almost unlimited storage capacity [4]. Using these new technologies as a rehabilitative tool and facilitator creates a technological gap between people who are capable or comfortable with using ICTs and those who are not.

Aromatherapy has been shown to affect physical, mental, and psychological factors in a wide range of participants, reducing sympathetic activity, increasing parasympathetic nerve activity, relieving stress, allowing muscle relaxation, and improving sleep quality [5,6]. Some patients understand Aromatherapy as complementary medicine consistent with their values, beliefs about the nature of life, and spirituality [7].

The result of the natural course of time leading to physiological is Ageing, enhancing psychological and social changes [8]. Another big problem in the older population is anxiety. This is associated with situations of dependence and limitations for those who suffer from it [9]. Depression is the most common psychological disorder of the elderly; therefore, depression in the elderly, after physical problems, is the second cause of disability in this period of life [10]. Both depression and anxiety are disorders that may be related to sleep problems [6]. Today it is a generalized disorder in our society. Lack of sleep causes fatigue, depression, stress and cognitive decline. It may be related to an increased risk of suicidal ideation, traffic accidents and unemployment rates due to impaired optimal work performance, leading to personal and social problems [5]. The sleep industry has grown over the years. This had to do that we could meet the demands and needs of the population [5]. Aromatherapy has been shown to affect physical, mental and psychological factors in a wide range of participants, reducing sympathetic activity, increasing parasympathetic nerve activity, relieving stress, allowing muscle relaxation and improving sleep quality [5,6]. Some patients understood Aromatherapy as complementary medicine consistent with their values, beliefs about the nature of life, and spirituality [6].

As main goals we wanted to study of the pre-implantation acceptance of technological measures aimed at reducing the level of anxiety in the resident population over 65 years.

2 Methods

2.1 Studio Design

An observational study with control a group had carried out. The total sample had 23 participants from convenience Senior centres managed by the Extremadura Service for the Promotion of Autonomy and Care for Dependency (SEPAD) (Olivenza, Zahínos y Alburquerque). Biometric health data, sociodemographic characteristics of the population and perception of quality of life had collected with the Spanish value set for the Europol 5D-5L questionnaire [11]. Participants could not present cognitive impairment, which was established if or more fails were identified in the Pfeiffer Short Portable Mental Status Questionnaire (SPMSQ) [12]. We collected the acceptance of technological measures with a semi-structured interview, thereby determining the needs and demands of the population in terms of technological devices and treatment techniques for the creation of a device that can provide a solution to those needs through the scale of acceptability of the use of new technologies (TAM) [13]. Finally, data is also collected on the degree of daytime sleepiness of the study population with the Epworth Sleepiness Scale [14].

This study was accepted by Ethics Committee for Drug Research in Badajoz (CEIm) with code AAL-2020-7-112-SCP.

2.2 Participants

The following criteria were proposed for inclusion:

- Persons over 65 years
- Institutionalized in residences or night centres
- Possibility of monitoring the use of the device
- Acceptance of the use of the device
- Digital knowledge or skills.

As a criterion for exclusion:

- Smoking
- Diagnosis of diabetes
- Diagnosis of dementia
- Pathologies related to epilepsy or seizures
- Eye pathologies related to tension, structure or degeneration (No glaucoma/cataracts/macular degeneration/blindness)
- Olfactory pathologies
- Respiratory pathologies
- Mood disorders

2.3 Search Strategy

During April and May 2022. A reading of the scientific literature was carried out following the keywords “aromatherapy,” “elderly,” “new technology,” “anxiety,” and “Illness.” From September to October we interviewed 23 adult people. Data collection has been structured based on internationally validated scales. The collection had carried out by a health professional assigned to collect sociodemographic data and those related to their health condition.

2.4 Data Analysis

The aim is to collect the following variables:

- The sociodemographic variance of the population: Sex and Age.
- Variables that encompass health status: Comorbidity, Physical activity you do and Quality of sleep.
- Presence of mental disorders such as depression and anxiety.

The review has structured data collection based on internationally validated scales such as the Epworth Sleepiness Scale [13]. The perception of the use of the device is assessed (based on the scale of acceptability of the use of new technologies (TAM) [14]. The scale is divided into 4 dimensions that encompass user acceptability of use: the Acceptance of use, the perception of use, the period of use and the relativity against the use of the device [14].

2.5 Use, Confidentiality and Storage of Data

The tutors or persons responsible for the study participants signed informed consent. Confidentiality was maintained following current regulations: EU General Data Protection Regulation (2016/679) (“GDPR”) establishes the legislative framework for data protection and privacy issues in the Member States of the European Union since 25 May 2018.

Piloting with ALTO took due account of all relevant legal requirements and ethical guidelines. It complies with fundamental ethical principles in the use of personal data and the participation of human beings throughout the development and tasks of the project. It accedes to the GDPR. In addition, since special categories of data had been treated (e.g., health data), Salud and ALTO adhere to national laws and regulations regarding the participation of human participants and personal data.

All participants were assigned case identities that were the basis for all subsequent analyses and had the only identifying information in the dataset. The analysis was based on the investigation of the relationships between the general characteristics of the samples. It never identifies sure participants unless data have been obtained that confirm risk to their health. No information on the identity of respondents had been transmitted to any external body or organization; all data was tired securely. Primary Users identify with the mapping code provided by the ALTO web application, while secondary users A and B have an alphanumeric identification code.

2.6 Financing

The project is run by a Danish SME and a Belgian design company. Both will undertake design, ergonomics, and usability testing, and co-develop and test prototypes with end users and other stakeholders in Belgium, Spain and Denmark. The project is funded by the European AAL call.

3 Results

The median age of the study population was 73 RIQ [69–85] and did not follow a normal distribution.

Of the study population, 18 (78.3%) were women and 5 (21.7%) were men. Regarding marital status, 2 (8.7) were single, 9 (39.1%) were married and 12 (52.2) were widowed. Finally, regarding the level of training, 21 (91.3) of the people had primary education, 1 (4.3) had secondary education and 1 (4.3) university education.

Of the 23 respondents, 16 already use a technological device, while only 6 people do not yet have a smartphone (Fig. 1).

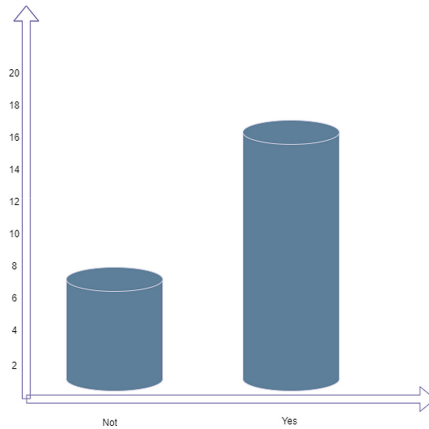


Fig. 1. Use some technical device (including smartphone).

To the question would you use a device to remember those smells? A total of 18 people said yes, and only 2 said they did not want to use a technological device (Fig. 2).

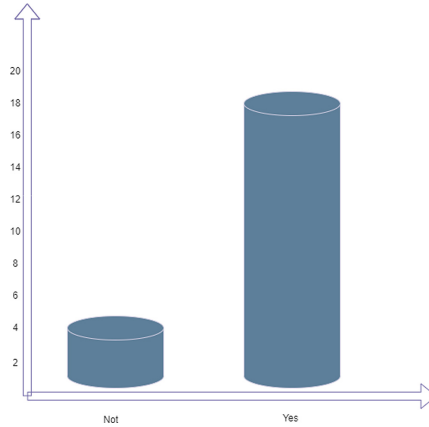


Fig. 2. Would you use a device to remember those smells?

The smells best identified by users were Coffee, Roses, Lavender, Hay of Pravia, Rosemary and orange blossom. (Table 1). Coincidentally in the same smells, regardless of gender.

No significant differences were found in the perception of the use of technological devices in the population surveyed (Table 2). However, we note that most of the population has a low acceptability of using technology as a technological measure.

Table 1. Odours identified by the study population

Sex	Smells that remind you of your childhood? Do these smells relax you?
Men n= 5	Cafe (3) * Fresh field (1) Orange blossom (1) Lizard (1) Penny royal (1) Rosemary (2) Roses (4) *
Women n=18	freshener (2) Cafe (1) Chocolate (1) Rose (4)* Lavender (3) * Heno of Pravia (4) * Rosemary (3) * Flowers (2) Spring (1) Fresh-cut grass (1) Night star (orange blossom) (3) *

Table 2. Predisposition to use technological devices understood as technological solutions n (23)

	Low acceptability	Middle acceptability	High acceptability	P value
Perception of use n (%)				
Women	9 (50)	6 (33.3)	3 (16.6)	0.399 ¹
Risk perception n (%)				
Women	7 (38,8)	5 (27,7)	6 (33.3)	0.223 ¹
Privacy concern n (%)				
Women	8 (44.4)	7 (38,8)	3 (16.6)	0.497 ¹
Enabling— Conditions n (%)				
Women	9 (50)	9 (50)	-	0.545 ¹
Utility of Perceived Use n (%)				
Women	8 (44.4)	10 (55,5)	-	0.327 ¹
Predisposition to use TOTAL n (%)				
Women	77 (38.9)	6 (33.3)	5 (27.8)	0.810 ¹

1 Chi Cuadrado of Pearson

Table 3. Sleep quality of sample n (23)

	Normal sleep	Average drowsiness	Abnormal drowsiness	P value
Women	2 (100)	2 (100)	14 (73.7)	0.057 ¹
Men	-	-	5 (21.7)	

1 Chi Cuadrado de Pearson

Table 4. Relationship between the perception of the use of devices as technological solutions and sleep quality.

	Low acceptability	Middle acceptability	High acceptability	P value
Normal sleep	1 (50)	1 (50)	-	0.757 ¹
Average drowsiness	1 (50)	-	1 (50)	
Abnormal drowsiness	7 (36.8)	6 (31.6)	6 (31.6)	

1 Chi Cuadrado of Pearson

Regarding the quality of sleep of the population studied, the vast majority present abnormal sleepiness, although they are not statistically significant data (Table 3).

Regarding the relationship between the degree of acceptance of technological devices as technological solutions and sleep quality, no significant difference has been observed (Table 4). It is observed that most of the population with a worse quality of sleep, is grouped in the group with less acceptance of the use of technological devices.

4 Discussion

Studies on equipment and use of new technologies in Spanish households show that only 7.5% of those over 65 use them, compared to 87% of those under 25. The profile of the older person who uses this more active technology is usually that of a man, in the first decades of his old age, who enjoys healthy ageing, with a good level of education, for whom the training that requires the use of them (computer, Internet) is not a great difficulty [15].

Today with the increase in the use of technological tools in companies, study instruments have been developed to assess their effectiveness. One of the most used predictors throughout history has been the Model of Acceptance of Technologies (TAM), having several model updates in recent years [16]. TAM was created to explain the use of new technologies in different contexts, depending on how users accept and use a technological tool. It is based on the Theory of Reasoned Action (TRA). That is, its only objective is to predict people's behaviour based on their attitudes and intentions. It also states that the relationships between convictions, attitude, sense, and behaviour indicate user acceptance concerning IT [17]. Based on the data obtained, it is essential that there is the motivation to use technological devices since most of our sample does not conceive the use of devices as technological solutions.

Older adults are generally considered among the most vulnerable groups of the population and providing them with psychophysical health requires special attention. In addition, to experiencing physiological changes, older adults face major changes in their social environment, such as retirement, the death of friends and family, the decline in social activities and changes in social and economic relations, which can affect their mental health and happiness. Older people want to live and age at home, prioritizing their private life and social environment [6]. In addition, people with sleep disorders experience depression, anxiety, and panic disorder, making it difficult to participate in the intervention and rehabilitation programs [18]. Despite not having found significant differences with our sample, most present poor sleep quality and are at the bottom in terms of acceptance of technological solutions.

Aromatherapy is used with conventional treatments to modify or treat diseases and can be applied in different ways. We find two types of Aromatherapy inhalation and aromatherapy massage. The treatment of depression and anxiety involves pharmacological and non-pharmacological interventions. For example,

benzodiazepines, the main anxiety treatments, are associated with headaches, drowsiness, lethargy, fatigue and ataxia, and the risk of dependence. These symptoms are often more prominent in older populations due to metabolic changes associated with normal Ageing. It uses drugs to minimize the side effects and control anxiety, one of which is the essential oils of aromatic herbal compounds [19,20]. However, our results show that the most requested aromas are the smell of wet grass, roses and Heno de Pravia, which because they are smells that can be smelled today, limits the need to use technological devices to remember those smells. People say it's easier to go out and smell it naturally.

5 Conclusion

There is no significant evidence that the study population perceives new technologies as a tool to stay at home. There is no significant data to relate the use of technological devices with sleep quality. The sample has been poor and convenient

Declarations

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- Consent to participate
- Consent for publication
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- Authors' contributions: Authors contributed equally to this work

If any of the sections are not relevant to your manuscript, please include the heading and write 'Not applicable' for that section.

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Solutions for Active Aging, Social Integration and Self-care



Proposal for an Occupational Therapy Intervention Using the Virtual Reality Game System “Oculus Quest” for Active Ageing

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Abstract. Introduction: Occupational Therapy works to achieve a higher level of functionality during ageing, trying to alleviate balance and mobility difficulties, for which we can use ICTs. Virtual reality is a tool that can be used in rehabilitation to train specific motor skills or cognitive functions through simulated environments.

Objective: To develop and make an intervention plan for older adults with balance and gait disorders available to the occupational therapy discipline, using virtual reality glasses ‘Oculus Quest’ as a therapeutic tool.

Methodology: The ‘Oculus Quest’ tool for occupational therapy in active ageing is described. A systematic search was carried out in Scielo, Dialnet, Cochrane, ScienceDirect and PubMed, applying a language restriction to articles in English and Spanish.

Results: According to the bibliography study, an occupational therapy intervention proposal was designed using the “Oculus Quest” VR goggles to improve balance and gait disorders in the elderly.

Conclusion: VR brings multiple benefits to improving balance and gait in active ageing, although more research is needed in this field. The program that has been developed provides occupational therapists with a tool that is very useful in interventions for active ageing. Combining conventional therapies with VR can bring modernity and motivation to users.

Keywords: Occupational therapy · Virtual Reality · Older Adults · Balance · Gait

1 Introduction

Occupational therapy is a social-health discipline that deals with the promotion of well-being and health through occupation. This last is achieved through the implementation of

activities to achieve optimal performance in the areas of occupation (primary, instrumental, education, work, rest and sleep, social participation, and leisure and free time or play) for the user to achieve the highest possible degree of autonomy [1]. The Occupational Therapy rehabilitation area works so that users achieve a higher level of functionality, considering motivation and active participation in the treatment.

During ageing, a series of changes occur in which the proprioceptive system, related to motor control, may be affected. This last means that one of the treatment's most important aspects is balance and mobility [2]. Changes in higher mental functions occur over the years; this may be due to a natural worsening or a consequence of a disease, such as dementia. Mild cognitive impairment is usually more common than dementia, which often anticipates dementia. The functions traditionally affected are memory, processing, learning and communication [3].

Information and Communication Technologies (ICT) have significantly changed our lives in the last few years. This advancement has increased our quality of life with cell phones and computers. Within the health and social-health professions, they have also played an important role, with ICT being used as a rehabilitation method [4]. The literature review by Martínez et al. [5] analysed the possibilities offered by new technologies to people with mild to moderate cognitive impairment. As a result of this research, using ICTs could reduce some symptoms associated with impairment, such as anxiety and depression.

Virtual Reality (VR) is a tool that can be used in rehabilitation to train specific motor skills or to generate changes in human performance; all this is carried out through simulated environments with the use of consoles that allow practice without causing damage [6]. VR can also be used as a tool for cognitive rehabilitation. The main objective of the intervention is to work on the cognitive difficulties that affect the daily lives of the elderly, either as a result of normal ageing or because of dementia. VR uses scenarios and activities through interactive games that help to intervene in different processes, such as memory or attention, among others [7]. VR projects graphic methods where the user can interact in real-time using sensory devices. Virtual rehabilitation arises from virtual reality and rehabilitation, defined as training in which simulated exercises are performed using virtual reality technology [8].

VR is a novel method that provides us with opportunities for assessment and rehabilitation by simulating scenarios that would be impossible to achieve by conventional methods [9]. Therefore, VR and interactive games may have advantages over traditional treatments. The possibility of performing activities that the person cannot do daily makes this type of intervention more motivating than other ones typical of conventional therapy, encouraging users to have more initiative and be more receptive to spending more time in therapies [10].

To recognise VR as such, it must meet several conditions, such as simulation, interaction, and perception. Simulation is the ability to reproduce a scenario that can convince the user that they are there; they do not have to be scenarios representing the real world. Interaction consists of the user having control in that scenario using controls, keyboard and mouse, or sensory suits. Finally, perception is the most critical factor. VR mainly addresses the senses through elements such as headsets or virtual reality goggles, which allow the user to enter into that created scenario [11].

Therefore, the overall objective of this study is to develop an occupational therapy intervention program using the virtual reality gaming system ‘Oculus Quest’ for elderly patients with mild to moderate balance and gait impairment. The specific objectives that have been established are to show the benefits of VR therapy for active ageing and to indicate the use of the virtual game system ‘Oculus Quest’ step by step.

2 Methodology

The design of the intervention program was based on the scientific literature consulted on virtual reality in intervention in the elderly. In the search for evidence on the use of virtual reality in rehabilitation therapies, we can highlight the study by Rogers et al. [12], which is focused on the effectiveness of using different virtual reality systems, such as the use of software created for cognitive and upper limb rehabilitation after a stroke. The study was conducted with 21 elderly patients aged 42–94 years, with a duration of 4 weeks, in sessions of 30–40 min, three times per week. This type of treatment was combined with conventional occupational therapy and psychology treatments. Initial evaluations were performed and repeated at the end of the study, resulting in a notable improvement in the experimental group’s upper limb, cognitive aspects and activities of daily living compared to the control that only received conventional therapy.

On the other hand, the study by Fang et al. [13] focuses on the evidence of using virtual reality games in which the participant’s movement is required for their use to improve balance in healthy adults. Sixteen experimental studies were compared, obtaining an average of 2–3 sessions per week, lasting 40 min, for eight weeks. As a result, an improvement in balance was identified when using virtual reality as a complementary treatment. Another study by Im et al. [14] aimed to improve balance and lower limb function in the elderly by using a three-dimensional interactive augmented reality system. Eighteen participants aged 55–80 years were chosen. Ten 30-min sessions were conducted over four weeks. The same scales were passed at the study’s beginning and end, improving balance and mobility in the lower limb.

According to the intervention proposals, their duration and timing, and the results obtained in the scientific evidence consulted, the occupational therapy intervention program for active ageing designed in this work is detailed below.

3 Results

3.1 Intervention Program

The proposed program aims at older adults of both sexes with an active ageing profile and mild or moderate alterations in balance and/or gait. As exclusion criteria to be a user of this intervention program would be, among others: users with advanced cognitive impairment, those with severe difficulty in mobility and users with severe vision difficulties.

For this intervention program, we will use the virtual reality glasses ‘Oculus Quest’ (Fig. 1), a gaming system designed for VR.



Fig. 1. Virtual Reality Glasses “Oculus Quest”.

The intervention will take 2–3 months, estimating that after that time the occupational therapist will have acquired the necessary knowledge to use the tool whenever they consider it essential and adapt it to each user. The chronology of the intervention program is as follows:

1. A critical aspect to consider is to avoid participant frustration during the use of the VR goggles, so in the first week, they will be shown the goggles and let try them out so that they can interact with them, as it is likely that they have never used one before. They will be explained what the intervention will consist of and the games to be used. The occupational therapist should plan the intervention, always taking care of this aspect of “no frustration” of the user.
2. In the second week, we propose to carry out the pre-intervention assessment using scales that evaluate the balance and gait of the participating users [15, 16].
3. From the third week until the end of the intervention, we will work with the “Oculus Quest” VR goggles for three days a week, in sessions of half an hour each day.
4. At the end of this program, a post-intervention assessment will be carried out with the scales used in the pre-intervention assessment. The results will be compared to evaluate the effectiveness of the tool used.




3.2 Virtual Reality Games

The intervention will be carried out individually, as this is how most of the games available on the platform are. All games are played standing up, and some have displacements, which allows the user to have the motivation to move.

The description of the games of the intervention program, as well as the indications to be followed for each of them, are shown in Table 1.

First Steps. Of the three days per week we will apply occupational therapy with VR, the first game will be presented to the user (older adult) as an intervention on the first day. In a room suitable for him to move freely and with the direct supervision of the occupational therapist, the player will try to pick up the objects that the game requests, for which he must make small displacements and movements of the upper limbs. The game also requests gestures like hitting, which allows training these movements and

Table 1. Serious Games of the intervention program.

Name	Main features	Description
First Steps	<p>Game mode: single user. Player modes: standing and moving. Language: Spanish. Duration: 10-15 minutes.</p>	<p>Interactive game in which the use of VR controls is taught in a simple way and through instructions. It is done through a series of objects that players can pick up, hit, or throw, for example.</p> <p>It also has aiming and dancing minigames with a VR avatar.</p> 
Bogo	<p>Game mode: single user. Player modes: standing and moving. Language: English. Duration: 15-20 minutes.</p>	<p>Interactive game that deals with the care of a "virtual pet" that you can brush, pet, play with and feed. It also contains a series of aiming and coordination minigames.</p> 
Anne Frank House VR	<p>Game mode: single user. Player modes: standing and moving. Language: Spanish. Duration: 25 minutes.</p>	<p>VR experience with the possibility of interaction. Travel back to the years of World War II and wander through the rooms of the Annex that housed the group of 8 Jewish people as they hid from the Nazis. Immerse the players in Anne's thoughts as they walk through each faithfully recreated room, thanks to the power of virtual reality, and discover what happened to the brave inhabitants of the house.</p> 

the postural adjustments each activity requires. The player is unconsciously training the proprioception of both his statics and movements. The object-throwing solicitations start the mechanisms of balance, postural adjustments and hand-eye coordination that favour the neuromotor processes of static and dynamic balance.

During the sessions, the occupational therapist will ask the player on their feelings about the game, what they liked the most, what took the most effort to perform and which

requests of the game were easier to execute. Care will be taken to avoid frustration, and the scores will be used only to motivate the player.

Bogo. We propose this game for the second day of each week of intervention. Pet care brings countless benefits to people, both at a motor level, due to the gestures that this care entails, and at a psychological and well-being level [17–19].

The simulation of this game sets in motion all the mechanisms of intentionality when caring for a pet, and can be used in occupational therapy as therapeutic elements. Although the sensation of touch is lost when petting, and the player cannot become aware of the pet's body, heartbeat, breathing, volume, and texture, since it is a virtual image, we get a virtual visualisation of the pet and the activities we can do with it. At the motor level, the gestures require hand-eye coordination and upper limb movements along with slight displacements that we can take advantage of for occupational therapy work. In addition, this game can provide therapeutic tools to work on sequencing certain activities and become aware of the care of a pet that can occur in a real scenario in the elderly.

Next, we will conduct the session of reflection and internalisation of sensations and the player's opinion about the tasks and actions developed in the game. We can end the session by proposing items to improve in the following session/week.

The game is presented in English, so the occupational therapist should translate to the player all the indications given throughout the game if the player does not know the language.

Anne Frank House VR. This game is proposed for the third day of the week. We play with the immersion in the characters' recreated lives, allowing us to put ourselves in their skin. We can use learning activities based on the game, so the therapeutic contribution in occupational therapy can be rich and varied. It requires movements and displacements immersed in a story and characters so that the player will not perceive the sensation of doing physical exercise but will benefit from the movement. It is crucial to the connotation of feelings of fear, hate, solidarity, sadness, joy, etc., that the game can bring to the player. Working on emotions can add benefits to the intervention from occupational therapy.

It is essential to exchange feelings and reactions with the occupational therapist at the end of the session to manage emotions for the patient's benefit. This intervention can be done jointly with the psychology professional.

The choice of these games for the intervention plan is because they all require the user to move and maintain balance during the development of the different games. These are new scenarios the user has never experienced, which could be a point in favour of increasing the motivation to work innovatively on gait and balance. The role of the occupational therapist in the use of VR would be to direct the user during the sessions, indicate the movements to be followed by the user, avoid falls during the games, choose the games that best suit the intervention, and establish the duration of the session for each user.

4 Discussion

The proposed intervention will allow, among other objectives, the following: a) To offer the Occupational Therapist an intervention tool for active ageing; b) To work through

this novel technique to improve balance and proprioception of position and movements, improve gait in terms of stability and safety parameters; and c) We propose a tool that transfers imagination and vision to virtual reality, which allows recreating motivating spaces for each user, thus personalizing the therapy and adjusting the interventions to each user. Therefore, it is a very versatile tool for the occupational therapy professional, allowing him to modify elements to achieve constant motivation of the user and better and faster intervention results.

The proposed assessment instruments are part of the occupational assessment, which as Moruno [20] quotes: “it focuses on identifying the problems that subjects have performing activities that are meaningful or those that correspond to their evolutionary state”. It mainly focuses on occupational performance, which in this case, is intended to obtain results on mobility, balance, and the transition from sitting to standing and vice versa.

Regarding the benefit for users of these therapies, as Schröder et al. says in their study [21], VR can increase users’ motivation allowing longer rehabilitation sessions. Thus, combining conventional therapies with VR therapies can bring a more significant number of benefits in obtaining favourable results.

We emphasize the occupational therapist’s important role in using VR, as the user needs guidance and direction during the sessions. The therapist must indicate the movements to the user and monitor their execution so that the movement is correct and safe, avoiding possible falls or harmful gestures during the intervention. One of the significant advantages of this therapy is the possibility of choosing the games based on the objectives of each intervention. Besides, occupational therapy can establish parameters appropriate to each user (i.e., duration of the session, intensity of motions).

In addition, another advantage is the accessibility and low cost of the different commercial VR devices, which makes it possible for it to be used by the user in the rehabilitation process. This type of therapy could bring modernity and motivation to users to get involved in occupational therapy sessions.

However, more studies are required to investigate this topic in future work. As Viñas-Díaz and Sobrido-Prieto [22] say, even with positive results from VR, there is not enough scientific evidence to define the conclusions in their studies, so studies with larger sample sizes and carried out over a more extended time would be necessary.

5 Conclusions

The studies’ results highlight virtual reality’s benefits in improving balance and gait in active ageing, and based on these benefits, we have developed our intervention plan. More research is needed, with larger sample sizes and more extended virtual reality testing periods, to compare data and obtain more conclusive occupational therapy intervention guidelines. Thanks to the development of the program as a guide, occupational therapists are provided with a tool that we consider very useful in interventions for active ageing. Combining conventional therapies with VR can bring modernity and motivation to users. The intervention with VR glasses ‘Oculus Quest’ should be understood and used in Occupational Therapy to complement another tool; it is not intended to be a unique therapy nor a substitute for other interventions.

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Validation of an App for the Awareness of Active Ageing Linked to Cultural Heritage

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Abstract. The number of apps with application in the field of active ageing has been increasingly used. In the AGEment project, an app to raise awareness among older adults towards the concept of active ageing, linking it to cultural heritage, has been developed. Validation of the app has been performed to evaluate the user-friendliness and the appropriateness of the awareness content, in which 51 older adult end users from 5 different countries have participated. Users have tested the app on their mobile smartphones and were requested to complete an online questionnaire with questions about content, usability and functionality, according to the e-MIS validation methodology. Results show that the AGEment app was considered as acceptable by the participants according to the usability validation (System Usability Scale score = 79.80). The most positive aspects of functionality (average score of 4.44 out of 5) were those related to the accessibility of the app. Nonetheless, the intuitiveness of the app and the loading of pages should be improved. Regarding user's perception of contents, they were evaluated positively (average score of 4.45 out of 5), especially in terms of quality and relevance in promoting active ageing. In conclusion, the app developed has been positively validated at the user level in terms of content, usability, and functionality. All content of the app is freely accessible in English and four other languages. In future works, more innovative and diverse content should be developed through the collaboration of older users, who are active co-producers and protagonists of the content.

Keywords: Usability · Content · Functionality · App · Validation

1 Introduction

It is not possible to live longer without ageing because it is an inherent process of life. Although ageing cannot be avoided, it can be controlled and postponed. Being active can lead to successful ageing. According to the World Health Organization, “active ageing” is the process of optimizing opportunities for health, participation and security in order

to enhance quality of life as people age. However, active ageing is not only about being physically active, but also about participating in social, economic, cultural, spiritual, and civic life. In the cultural field, Cultural Heritage can be transferred between generations in which older adults can have an important role. Today's generation should take care of and preserve societal or tangible values, such as monuments, art and cultural values, objects, and traditions coming from the past for the benefit of future generations. On the other hand, intangible or individual values as genetics, health, vulnerability, and frailty can be transferred to the next generations only by the life experience of today's generation. According to UNESCO, Cultural Heritage is widely defined as the legacy of physical artefacts and intangible attributes of a group or society inherited from previous generations that are kept in the present and granted for the future generation's benefit [1]. Cultural Heritage can be subdivided into tangible, intangible and natural heritage. Although there is an interdependence between them, the Intangible Cultural Heritage (Oral traditions and expressions; Performing arts; Social practices, rituals and festive events; Knowledge and practices on nature and the universe; Traditional craftsmanship [2]) has a recognized role as a source of cultural diversity driving sustainable development [3].

For the awareness of the Intangible Cultural Heritage, the AGEment project [4] has developed the first app for the awareness of active ageing linked to cultural heritage. This app has been designed for Android Smartphone devices and SmartTVs. Older adults can access content corresponding to different cultural areas, mainly composed of videos in which older people promote intangible cultural heritage [5]. Validation is an essential step when new software tools are developed. Different methodologies should be considered to cover the different aspects under validation and extract measurements (objective and/or subjective) to identify the weaknesses and strengths of the validated software. For that, the objective of this work is to validate the app for the dissemination of the awareness raising material created in the project in order to guarantee software of high quality.

2 Methodology

The validation methodology describes the pathway followed to improve and make the products created more efficient, thanks to the feedback from the target group who was asked to participate. Such validation plan of the AGEment app has been designed based on the e-MIS validation methodology [6, 7]. This methodology has been specifically designed to validate three aspects of Web environments for training in minimally invasive surgery. However, this methodology can be applied to any software with a graphical interface, as is the case of the apps developed in this project. It is based on the combination of different methodologies to validate content, usability, and functionality, using objective and subjective metrics, as shown in Fig. 1, where:

- Usability validation assesses the comprehensiveness, operability, and attractiveness of the learning environment.
- Content validation determines the degree of appropriateness of the material to the learning purpose.
- Functionality validation assesses aspects related to functionality and navigability.

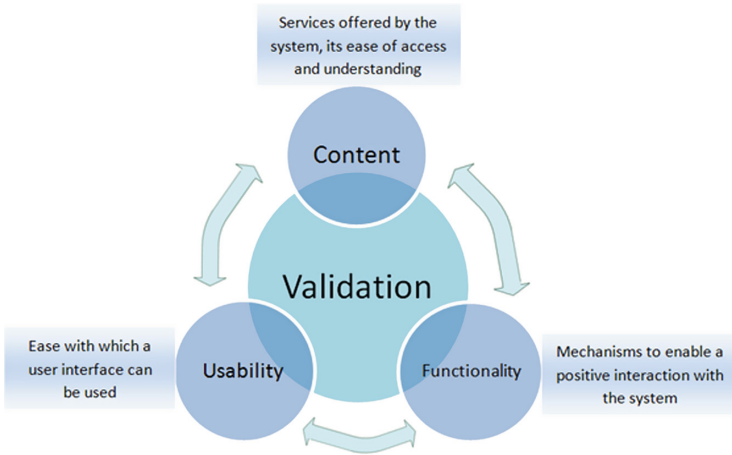


Fig. 1. e-MIS validation scheme.

2.1 Validation Process

End-users have been asked to examine the case studies developed in the AGement project using the implemented mobile app for at least seven days within two months. Afterwards, they have been asked to answer a questionnaire. In order to facilitate distribution and analysis of the questionnaires, online surveys have been created using Google Forms commercial survey delivery service. The first section presented the project and the objective of the questionnaire (Fig. 2).



Fig. 2. Initial section of the questionnaire.

All questionnaires have included an initial set of demographic questions that describes the user answering the survey. Data did not contain information that would allow person identification and have been registered and analysed anonymously according to the GDPR:

- Country of residence:
 - Italy
 - Spain
 - Portugal
 - Romania
 - Other
- Age:
 - 55–65 years old
 - 65–75 years old
 - 75–85 years old
 - More than 85 years old
- Gender:
 - Male
 - Female
 - Other

Content Validation. It determines the appropriateness of the material for learning purposes. The end-users assess the adequacy of the contents to meet the learning outcomes of the apps with the help of a subjective questionnaire using a 5-point Likert scale (1-Strongly disagree, 5-Strongly agree).

- Q1 - I believe that the content is unique, i.e. different types of content are not offered by similar platforms.
- Q2 - The content is innovative for the topic of active ageing.
- Q3 - The contents use an appropriate language for elderly.
- Q4 - The amount of contents is appropriate.
- Q5 - The contents are up-to-date.
- Q6 - The contents are realistic and relevant to promote active ageing.
- Q7 - The contents are easily understandable.
- Q8 - There is a wide range of content on the app.
- Q9 - Multimedia contents (pictures, videos) are of good quality.
- Q10 - The contents are well organised.

Usability Validation. It mainly assesses the attractiveness and user-friendliness of the apps. For subjective evaluation, a questionnaire was developed about the design, structure and layout of the apps. The system usability scale (SUS) was employed, as a valid methodology to measure subjective usability [8]. This scale has become an industry-standard, featured in over 1300 publications. It provides a 10-item questionnaire to users, which the user must rate on a Likert scale from 1 to 5 (1-Strongly disagree, 5-Strongly agree). To avoid repeated scores, odd questions ask about positive aspects and even questions about negative ones.

- Q11 - I think I would like to use this system frequently.
- Q12 - I found the system unnecessarily complex.
- Q13 - I think the system is easy to use.
- Q14 - I think I would need the support of a technical person to be able to use this system.
- Q15 - I found the various functions of this system well organised among themselves.
- Q16 - I thought there was too much incoherence in the design of the screens.
- Q17 - I imagine that most people would learn to use this system very quickly.
- Q18 - I found the system very complicated to use.
- Q19 - I felt very confident using the system.
- Q20 - I had to learn many things before I could use this system.

SUS yields a single number representing a composite measure of the overall usability of the system being studied. Note that scores for individual items are not meaningful on their own. To calculate the SUS score, first sum the score contributions from each item. Each item's score contribution ranges from 0 to 4. For items 1, 3, 5, 7, and 9 the score contribution is the scale position minus 1. For items 2, 4, 6, 8, and 10, the contribution is 5 minus the scale position. Multiply the sum of the scores by 2.5 to obtain the overall value of SU. SUS scores have a range of 0 to 100, with different acceptability ranges (Fig. 3).

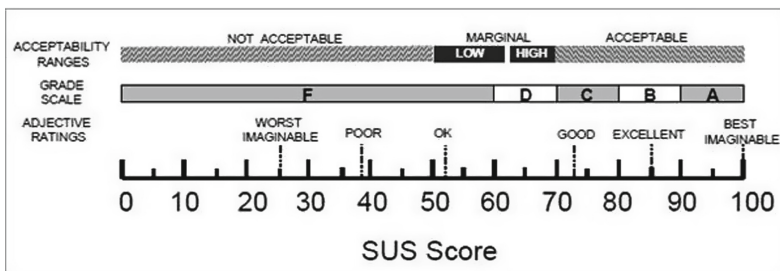


Fig. 3. Acceptability ranges of SUS.

Functionality Validation. It assesses aspects related to navigability and functionalities contemplated in the apps. In this case, end-users were asked to rate aspects of functionality using a 5-point Likert scale (1-Strongly disagree, 5-Strongly agree).

- Q21 - The access to the app is easy.
- Q22 - Changing configuration settings (language, etc.) is easy.
- Q23 - App navigation is intuitive.
- Q24 - Links work correctly.
- Q25 - It is easy to see where you can/should click.
- Q26 - App pages load quickly.
- Q27 - All the contents of the App are accessible without having to download and install additional programs.
- Q28 - App interaction functions are easy to use.
- Q29 - The app is not heavy and does not slow down other functionality on my phone.
- Q30 - The logo is easily identifiable.

3 Results

Fifty-one older adults participated in the validation process, distributed across the countries with a majority of Italians and Romanians (20 and 19) and contributions from Spain and Portugal (5 and 6). “Others” option included a participant from Romania who came from Moldova. Respondent profiles were characterised by 73% of people between 55 and 65 years old, 23% between 65 and 75 years old, and 4% between 75–85 years old. As for gender, females were slightly higher (59%).

3.1 Content Validation

Table 1. Results of content validation (average score and standard deviation).

Q	n					Average	Std. dev.
	1	2	3	4	5		
Q1	1	3	5	10	31	4.34	1.02
Q2	1	4	1	10	35	4.45	1.01
Q3	1	1	4	9	36	4.53	0.88
Q4	1	2	6	15	27	4.27	0.96
Q5	0	3	3	9	36	4.53	0.86
Q6	0	3	4	4	40	4.59	0.88
Q7	1	0	5	7	38	4.59	0.83
Q8	0	5	5	13	28	4.25	1.00
Q9	1	2	3	4	41	4.61	0.92
Q10	1	2	4	4	39	4.56	0.95

The analysis of the answers to the questions concerning the validation of the contents produced within the AGEment project and available through the app showed that most

respondents rated them as positive. An average of 70% of the cases gave the questions a score of 5 (completely agree), while 17% gave a score of 4. Overall, the average score assigned to content validation, on a scale from 1 to 5, was 4.45 (Table 1).

3.2 Usability Validation

The analysis of the results showed that the 51 participants expressed an individual SUS ranging from 40 to 100, which gave an average overall SUS score of 79.80. Therefore, according to the acceptability ranges of SUS, the usability of the app can be considered as acceptable (>70).

3.3 Functionality Validation

Table 2. Results of functionality validation (average score and standard deviation).

Q	n					Average	Std. dev.
	1	2	3	4	5		
Q21	2	1	3	7	38	4.53	0.99
Q22	1	2	3	10	35	4.49	0.92
Q23	3	1	5	14	28	4.24	1.11
Q24	1	1	4	8	37	4.55	0.88
Q25	1	1	3	11	35	4.53	0.86
Q26	1	1	6	15	28	4.33	0.91
Q27	1	2	3	5	40	4.59	0.92
Q28	1	2	3	12	33	4.45	0.92
Q29	4	2	3	12	30	4.22	1.22
Q30	1	2	3	10	35	4.49	0.92

With regard to the navigability and functionalities provided by the App, the analysis of the functionality validation shows that an average of 67% of the answers correspond to a score of 5 (completely agree) and an average of 20% to a score of 4. Overall, on a scale of 1 to 5, the average score for functionality validation was 4.44 (Table 2).

4 Discussion

The AGEment project developed an app for mobile devices intending to provide didactic content for the promotion of active ageing in older adults linked to the intangible cultural heritage, whose validation at the user level, in terms of contents, usability and functionality, was carried out in this study. Results demonstrated a positive user feedback regarding the mobile app since all the items have received scores higher than 3.5,

corresponding to the threshold of 70% that de Goes [9] indicated to be considered as successfully validated.

In terms of content validation, the statements with the highest scores (score of 5 given by 40 subjects or more) concern the quality of the content (Q9) and its relevance in promoting active ageing (Q6). With this positive evaluation, contents satisfy the needs of older people since Rocha [10] indicated that user's satisfaction correlates with the relevancy, accuracy, completeness, and comprehensibility of the information content. The statement with the lowest score (score of 5 given by 28 individuals) was the one concerning the amount of content available (Q8). During the next years, more innovative and diverse content should be developed through the collaboration of older users, who will be active co-producers and protagonists of the content.

With regard to usability validation, considering that it mainly evaluates the attractiveness and ease of use of apps by analysing their structure, we can say that the score assigned by the adults and older adults involved in the study (a target group that is not very familiar with new technologies) tends to be positive. This type of software must be properly oriented to allow the user to find content and adapt paths according to existing knowledge and needs [11]. The ease of use makes valid the premise that it is necessary to emphasize the location and visibility of buttons or links in platforms to make them user-friendly [12]. In addition, results show that the design is organised and coherent, meeting the premises for a quality website [13].

Regarding functionality validation, the statements that showed the best results (score of 5 given by 38 subjects or more) were those related to the accessibility of the app (Q27 and Q21). This positive result needs to be highlighted because additional software installation drastically reduces the potential impact of the platform [14] and increases the technological frustration of users [15]. The ease of access and navigation, together with user-friendliness achieved in the above-mentioned usability validation, guarantee user engagement with the app [16], and are indicative of the high quality of the platform [6, 17]. The statements with the lowest number of positive evaluations (score of 5 given by 28 people) were those related to the intuitiveness of the app (Q23) and page loading (Q26). Intuitiveness should be improved because it is a defined feature to achieve a successful functionality, but also usability [11]. Moreover, page loading is a critical point for user satisfaction and should be speeded because slow loading times may prevent users from on-going use of applications [18].

5 Conclusions

The AGEment app was successfully validated in terms of content, usability, and functionality. Firstly, the contents provided by the app were positively evaluated with an average score (on a scale from 1 to 5) of 4.45. The AGEment app was considered usable by the participants in the final validation (System Usability Scale score = 79.80). Finally, functionality aspects related to the accessibility of the app were positively rated, although the intuitiveness of the app and the loading of pages were identified as slightly more problematic. This study could serve as a basis for the design and development of similar mobile apps for the promotion of active ageing of older adults.

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Self-care Needs in Older Adults with Chronic Obstructive Pulmonary Disease Enrolled in a Community Care Unit: A Study Protocol

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Abstract. Older adults are often affected by chronic obstructive pulmonary disease, an ailment that is typified by the incidence and prevalence of respiratory symptoms that may compromise said people's self-care. Literature has revealed the importance of comprehensive respiratory rehabilitation in empowering people to provide themselves with self-care. Notwithstanding, the adoption of these programs is still low despite the numerous guidelines and directives in regard to intervention in respiratory rehabilitation. More recent literature proposes to increase adherence with household interventions and emphasizes the need to create specific intervention programs for older adults. However, it is important to understand what their self-care needs are so that the programs meet the needs of older adults with this respiratory pathology.

Objective: Describe the healthcare and self-care needs of older adults with chronic obstructive pulmonary disease enrolled in a Community Care Unit, in central Portugal.

Methods: This article is a study protocol and it is part of a research program that aims to develop household intervention in Respiratory Rehabilitation Nursing that is capable of promoting self-care in older adults with chronic obstructive pulmonary disease through the creation of complex interventions based on the guidelines and principles of the Medical Research Council, which is integrated in the development phase. It is a qualitative, exploratory, and descriptive study based on individual, semi-structured interviews. The sample will consist of 10 people aged 65 or over, diagnosed with chronic obstructive pulmonary disease. The gathered information aims at an in-depth understanding of the phenomenon.

Keywords: Older adults · Self-care · Chronic Obstructive Pulmonary Disease · Study protocol

1 Introduction

Your The pace of aging is rapidly increasing around the world [1]. More than a fifth of the population of the European Union was aged 65 or over in 2021 [2] and forecasts indicate

that there will be 149.2 million older adults living in the EU in 2050 [3]. According to the Instituto Nacional de Estatística (National Institute of Statistics), in Portugal [4] the population aged 65 or over could increase from 2.2 to 3.0 million people between 2018 and 2080. The ageing of the population exerts great pressure on health and social security systems [5].

Chronic obstructive pulmonary disease (COPD) is a common pathology in older adults [6, 7] and is one of the main causes of illness and death worldwide [8, 9], being defined as a common, preventable and treatable disease characterized by persistent respiratory symptoms and airflow limitation resulting of alveolar and/or airway changes caused by significant exposure to harmful particles or gases and influenced by host factors [8]. In addition, a person with COPD has physical, psychosocial, and emotional deficits that restrict their ability to carry out their own self-care [10].

Self-care is a fundamental nursing concept [11] and the central concept of Orem's theory [12, 13] and in this context it refers to the ability to take care of oneself by oneself and for oneself [14], having in mind that the ability to self-care is inherent in human beings [15] and is not related only to the basic and instrumental activities of daily living [15].

People with chronic obstructive pulmonary disease (COPD) have self-care hardships, namely breathing, eating, dressing, and taking care of their own hygiene [10] and nursing intervention in older adults aims to promote a self-care behavior [16]. Although much of the focus of recent research has been on the promotion of self-care for people with COPD [17], the World Health Organization [18] states that this area requires more research and recent literature [9] recommends carrying out a self-care adherence program for older adults with chronic obstructive pulmonary disease. However, for that it is first and foremost necessary to understand how people take care of themselves [19], i.e., health professionals must recognize and understand people's guidelines and expectations, which are highlighted in the qualitative evidence, to design tailor-made self-care education plans [19].

That being said, this article aims to carry out a study protocol whose purpose is to describe the healthcare and self-care needs of older adults enrolled in the Community Care Unit (CCU) of Fundão to develop home intervention of Respiratory Rehabilitation Nursing at a later stage in order to promote self-care in older adults with COPD.

2 Background

According to biological, psychological, and social theories, human ageing can be characterized by a set of progressive losses [16] and in the perspective of health sciences it is associated with an increase in serious chronic [16, 21] illnesses in people [20], namely respiratory-related pathologies [22].

The morphological and functional resistance of the respiratory system weakens [23], with a reduction in gas exchange and airflow obstruction [24], which explains why morbidity and respiratory-change symptoms are exacerbated in the elderly [23]. All these factors make chronic obstructive pulmonary disease prevalent in older people [23]. Chronic and progressive dyspnea is the most characteristic and most worrying COPD symptom [8, 25] in people with COPD [19]. To alleviate dyspnea people reduce their

physical activity, starting a vicious cycle of progressive maladjustment to exercise, which leads to an increase in muscle weakness and the presence of dyspnea at increasingly lower efforts. [26].

In addition, and as time goes by, health problems tend to accumulate and people begin to lose the ability to carry out their daily activities, [27, 28], such as getting dressed, going to the bathroom, having a bath, and eating [29], thus influencing their self-care ability [16].

The concept of self-care was first used in nursing by Dorothea Orem in 1959 [13] in the General Theory of Nursing of this theorist and emerges as the culmination of her constant concern in improving nursing care combined with her enormous professional experience [12]. “Caring, providing care, and taking care is, first of all, an act of life” [30]. Caring and being cared for can give meaning to life and help others grow [31], since caring is the basis and support of every human relationship and it imposes itself by ascertaining the fragility of the human being who is target of concern or attention [32, 33].

Three self-care requirements were identified, which express the nature and reasons for the types of self-care, and which are subdivided into universal, developmental, and health deviation [14]. Health deviation requirements are related to the occurrence of genetic alterations or of another type that affect the physiological and/or psychological mechanisms [14]. These requirements comprise six categories of self-care: seeking adequate medical care, becoming aware of the disease and its effects, carrying out the measures prescribed by the doctor, monitoring the effects of the treatment, accepting your new health status, and adopting measures that promote its improvement [14].

Despite being an abstract concept, when expressed in terms of limitations the self-care deficit helps to understand the person’s role in self-care and provides indications regarding the selection of nursing interventions [13]. In this sense, both the needs arising from ageing and health deficits influence the ability to perform self-care, which is due, in large part, to functional limitations [16].

Self-care is a fundamental element in the treatment of people with chronic diseases [34] and, in people with DPOC, self-care refers to the skills needed to comply with the therapeutic regimen and behavioral change to manage your symptoms as to achieve a functional life [9].

3 Methods

This article is a study protocol of an exploratory and descriptive study framed in the qualitative paradigm that will be guided by the initial question “What are the needs of older adults with COPD and enrolled at CCU of Fundão regarding self-care?” This question aims to identify the health care needs regarding self-care of older adults with COPD enrolled at the Community Care Unit of Fundão and describe them in order to obtain contributions for a more comprehensive research project, which aims to develop home intervention practices of Respiratory Rehabilitation Nursing to promote self-care in older adults with COPD. Considering the objectives defined in the research project, we resorted to the design of complex interventions based on the guidelines of the Medical Research Council, with this study in particular adhering to the intervention identification phase [35].

Complex interventions are usually described as interventions that contain several interacting components [36], hence they are widely used in health services [35, 37, 38]. Furthermore, such is the complexity of nursing that it can be seen as the quintessence of complex intervention [39] defined as a role that, due to the properties of the intervention itself, contains a series of components with potential for interactions between them and that, when applied to the intended target population, produces a series of possibilities and variable results [35, 39].

Self-care interventions are among the most promising and exciting new approaches to improve health and well-being. From the point of view of both health systems and people, they have the potential to increase choice and autonomy when they are accessible, acceptable, and affordable, and promote self-determination, self-efficacy, autonomy, management involvement in health, and better health outcomes [40].

In people with COPD, self-care improves the quality of life and reduces the risk of exacerbations and mortality [17]. However, people with this pathology are usually faced with complicated and demanding self-care interventions at home due to the intensity of the symptoms and the often progressive nature of the disease [17].

Having in mind that the object of study of this research is the self-care needs of older adults with COPD, qualitative research is specified as it allows a detailed understanding of the problem and contributes to validating the theory from an inductive reasoning process [41], but also because it focuses more on the action and on specific problems and situations [42] and allows the study to evolve naturally to also understand the meaning of health care [41] and self-care needs for the elderly. The qualitative research modality allows exploring and understanding the meaning that people or groups of people attribute to a social or human problem [43, 44] and, because Community Care Units provide health care close to the community in their geographic area of intervention [45], health professionals in general – and nurses in particular – must pay attention to each person in a unique way, personalizing care as each person will have their own unique story [46] and, thus, the study of self-care needs of older adults with COPD is paramount for defining the respiratory rehabilitation nursing intervention, which promotes self-care.

Participants will be men and women, aged 65 years or over, diagnosed with COPD, who will be recruited from the clinical files and who must express their desire and willingness to participate. Previous knowledge of the problem suggests that ten participants will be enough to achieve data saturation, but this number can be adjusted, since data saturation does not depend on a single factor [47]. They will be intentionally selected, taking into account the qualities of the participants to obtain testimonies from those who have the best knowledge on the subject and that can provide insight to the phenomenon that is being studied. [41, 48].

Information will be obtained from semi-structured interviews to find out how subjects act and rebuild the system of social representations in their individual practices [42]. It's not just a question of obtaining information on the subject we are investigating, in this case self-care in older adults with COPD, but also about people's behavior when facing this issue. [42].

Semi-structured interviews are used when researchers have topics [47], and in this study the topics emerged from the conceptual framework of Orem's theoretical model [14], namely the perception of the disease and its effects, the search for adequate medical

assistance, carrying out the measures prescribed by the health professional, monitoring the effects of the treatment, accepting the new state of health, and adopting measures that promote its improvement. The added value of the semi-structured interview is that it allows extracting information from key participants who gather personal experiences, attitudes, perceptions, and beliefs related to the subject to be studied [49]. Based on the topics, the semi-structured interview will be based on six main questions. However, as qualitative research is interactive, there may be a need for additional questions [49]. The script will be previously tested on a participant and changes will be made if this need is verified.

– Interview guide.

Interview script	Initial question: What are the self-care needs of older adults with COPD enrolled at CCU Fundão: Objective in terms of health care, identify the self-care needs of older adults with COPD enrolled in the Community Care Unit of Fundão and describe these needs to obtain contributions to subsequently develop the intervention		
Topic	Questions	Objective(s)	Accessory questions
<u>Perception of the disease and its effects</u>	1 st What is it like to live with this disease?	- Knowing the person's perception of their disease; - knowing the effects that the disease causes on the person	- What symptoms does this disease causes him/her? - What worries you the most about your disease?
<u>Seeking proper medical care</u>	2 nd How do you treat your disease on a daily basis?	- Identify health resources used by the person in managing the disease	- Do you seek help when you feel worse? - Who do you seek?
<u>Carrying out the measures prescribed by the doctor/health professional</u>	3 rd Are you able to comply with the measures and advice that health professionals (doctors and nurses) recommend?	- Identify the person's knowledge regarding the care he/she considers necessary for the management of the disease - Identify the difficulties experienced by the patient regarding the management of the disease	- Do you have difficulties complying with the doctor's and nurses' recommendations regarding the treatment of your disease? What are these difficulties related to?
<u>Monitoring of treatment effects</u>	4 th Do you consider that the treatment you have received for your disease has been beneficial or effective?	- Knowing the person's perspective regarding the benefit of therapeutic measures and care	- Is your daily care effective?

(continued)

(continued)

Interview script	Initial question: What are the self-care needs of older adults with COPD enrolled at CCU Fundão: Objective in terms of health care, identify the self-care needs of older adults with COPD enrolled in the Community Care Unit of Fundão and describe these needs to obtain contributions to subsequently develop the intervention		
Topic	Questions	Objective(s)	Accessory questions
Acceptance of your new health status	5 th Did the disease change your life? How do you deal with that change?	- Knowing the person's perspective regarding the acceptance (or not) of his/her new health status	- What changes did this new health condition cause you in your daily life?
<u>Adoption of measures that promote an improvement</u>	6 th Do you think you will be able/willing to take other measures/care that can contribute to your improvement?	- Explore the acceptability of carrying out a new intervention at home	- Given that your disease is chronic, are you open to other care?

In qualitative research the information must be obtained in the context of the occurrence between the actors that participate in the interaction, the researcher and participants, following the normal process of daily life [42]. In that case, the interviews will be carried out at the homes of older adults with COPD and will be audio recorded for later transcription. The researcher's friendly attitude, active listening, and his/her repetition of the questions are key aspects that are encouraged, and participants will be encouraged to provide details [49] to thoroughly understand the problem.

After collecting and transcribing the information, its content will be analyzed, as it's one of the most used and appropriate methods in qualitative research for scientific research in the nursing field [43, 48]. Having in mind the interaction between the initial theoretical framework and the specific problem that we intend to study, the next step will be to detect the presence or absence of the response categories, provided a priori by the topics of the interview [50]. The thematic analysis will allow us to summarize the results in a coherent and meaningful way, so that, in terms of health care, we can identify the needs regarding the self-care of older adults with COPD enrolled in the Community Care Unit of Fundão and describe those needs.

4 Ethical Considerations

Ethical and deontological considerations involved a set of procedures, namely the request for authorization to carry out the study to the Grouping of Health Centers of Cova da Beira and the request for an opinion to the Ethics Committee of the Regional Health Administration of Center Portugal. Both issued a favorable opinion about carrying out the

study. A request for free and informed consent will also be made to the participants after a detailed explanation of the purpose of the study and how the information will be obtained, guaranteeing their anonymity and assuring them the right to refuse to participate in the study at any time during the investigation. Participants will also be assured that the information collected in the interviews will have the sole purpose of carrying out the study.

5 Conclusion

Due to the multiple health problems they present, including muscle weakness and dyspnea [51], according to the Orem's theoretical model [14], people with COPD portray therapeutic self-care needs [52], and interventions aimed at people with COPD should be centered on their individual needs [53]. For this, health professionals must recognize and understand people's guidelines and expectations, which are highlighted in the qualitative evidence. [19]. Thus, with the description of a research protocol on the self-care needs of older adults with COPD, this article may help other researchers in developing self-care interventions aimed at older adults with COPD, which is an urgent area [40] that is defined as being of core importance by recent literature [9].

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Development of Self-care Competence of the Older Adults with Bowel Elimination Ostomy

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Abstract. Introduction: Colorectal tumor is one of the leading causes of death by cancer in both sexes in Portugal. The traditional treatment consists of performing a surgical intervention called bowel elimination ostomy. This procedure triggers a physical impact, which has emotional, psychological, and social repercussions, requiring the adoption of adaptive strategies and readjustment in self-care and lifestyle habits of the older adult. **Objective:** To identify the benefits of self-care interventions that promote positive changes in older adults with a bowel elimination ostomy in the pre-surgical stage. **Methods:** The search was conducted in the MEDLINE Complete and CINAHL Complete databases through the EBSCOhost platform to identify articles published between 2015 and 2020. After applying the inclusion and exclusion criteria, seven studies were selected. The evidence levels of the articles were ensured by the contributions of Melynck and Fineout-Overholt (see references). **Results:** Nursing interventions include implementing the Enhanced Recovery After Surgery program and structured educational programs. They are associated with improved self-care ability, reduced complications, reduced length of stay at the hospital, and improved quality of life. **Conclusion:** Nurses play a vital role in promoting adaptation to the new reality, from educating the older adult to self-care for their stoma.

Keywords: Nursing Care · Older Adults · Ostomy · Colostomy · Ileostomy · Self-care

1 Introduction

NCDs arise, for the most part, from situations that arise throughout the life cycle, and which result from the adoption of inappropriate personal habits and lifestyles, i.e., they are modifiable by us. Currently they represent 86% of all deaths in Portugal and are the primary cause of premature death, constituting a serious public health problem [1–4].

Within NCD, neoplasms remain one of the main causes of death at the national level, being the CCR, the type of tumor that most contributes to this panorama. In 2018, 28 960 people died from cancer, 14% of which were RCC [5].

Thanks to scientific and technological advances, the person diagnosed with CCR, can survive by performing a surgery with OEI formation. This is considered the treatment of choice for the tumor in question, being one of the pathologies that most contributes to the creation of a stoma [6].

The OEI, a surgical procedure in which an artificial opening is created, to eliminate the fecal content, transforms the life of the person to whom it is submitted. The surgery results in a stoma and not a scar, and the gastrointestinal physiology is altered, breaking with the body scheme. Moreover, the presence of an ostomy requires several actions for the patient to take care of himself, such as hygiene of the stoma and application of provisions associated with it. Thus, the physical, psychic, social and emotional dimensions of the individual are affected, as well as their quality of life [7].

In the follow-up, the education of the patient is essential, so that he can adapt and accept his condition. In this aspect, the nurses assume a truly important role, providing support throughout the perioperative period of the patient, being the educational practice, the center of all nursing interventions [6].

2 Objective

To identify the benefits of self-care interventions that promote positive changes in older adults with a bowel elimination ostomy in the pre-surgical stage.

3 Methods

3.1 Ethical Aspects

No opinion was requested from the Ethics Committee as this was a secondary study. In the formulation of the problem there was the concern with the respect for the principles of clarity, objectivity and precision, so that the results are assumed as an added value for nursing care in the mobilization of the older adult after hip arthroplasty. The analysis of data extracted from the selected studies was developed in line with the principle of respect for the results obtained in these investigations and by these investigators. The reference of the authors was in compliance with the standards of good academic and scientific practice.

3.2 Type of Study

The choice of an integrative literature review had the purpose of accessing current knowledge on the problem under study and thus contributing to the incorporation of the findings of this study in practical contexts. The methodological procedures used involved the following steps: 1) identification of the starting question; 2) definition of inclusion and exclusion criteria of studies; 3) definition of the information to be extracted from the studies; 4) analysis of the included articles; 5) presentation and discussion of results; and 6) synthesis of knowledge.

3.3 Methodological Procedures

A research question was formulated using the PI[C]OD methodology, being (P) the target population, (I) the type of intervention, (C) the comparisons, (O) the outcome and (D) the type of study (design). Following this structure, the following guiding question was elaborated: *“In older adult with ostomy of intestinal elimination (Population), is there evidence to suggest that self-care interventions in the pre-surgical phase (Intervention) promote positive changes in their health condition (Outcomes)?”*.

The research strategy adopted included the research of articles published in Portuguese, English and Spanish, which took place during May 2020 in the MEDLINE Complete and CINAHL Complete databases through the EBSCOhost platform. Specific descriptors were used, which were connected with the Boolean operators “AND” and “OR” in the following arrangement and in the following order:

[(ostomy) or (colostomy) or (ileostomy) or (stoma) or (ostomates) or (intestinal stoma)] AND [(selfcare) or (self-care) or (self-management)] AND [(benefits) or (advantages) or (positive effects) or (importance) or (impact) or (health promotion) or (promoting health)].

Regarding inclusion criteria, we used studies with quantitative and/or qualitative methodologies, from academic journals and articles, published in their entirety (full-text), in Portuguese or English, and that sought to answer the above-mentioned guiding question, with available references and publication date between January 2010 and May 2020. Along with the exclusion criteria, all articles with ambiguous methodology, with no correlation with the subject under study, repeated in both databases and prior to 2010 were assessed. By applying the inclusion criteria, 37 articles were obtained. The evaluation of these articles was carried out in three phases: (i) reading of titles, with 11 articles selected; (ii) reading of abstracts, justifying the potential of 8 articles; (iii) analysis of methodological quality and full reading of the articles, identifying 6 articles, as shown in Fig. 1.

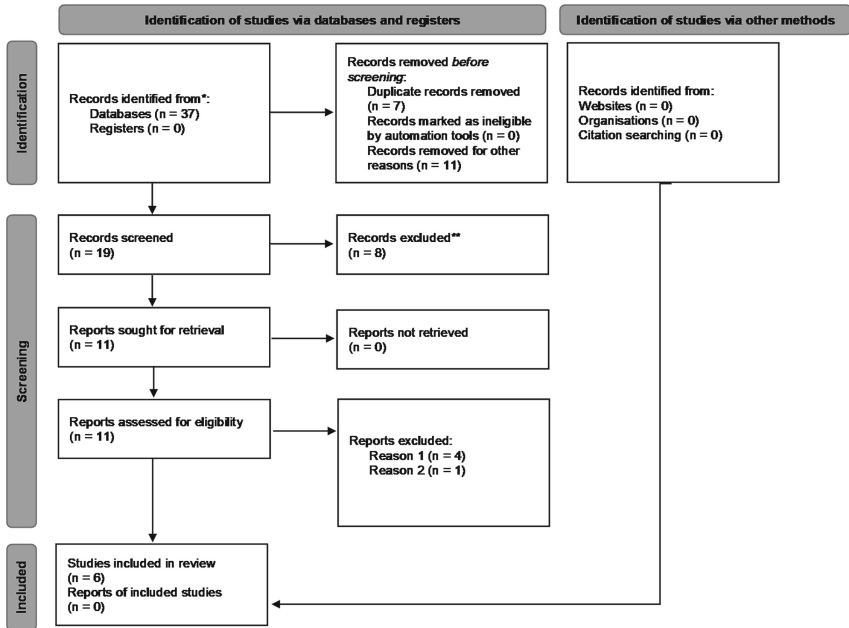


Fig. 1. PRISMA Diagram for the presentation of the research methodology.

4 Results

After the analysis of the selected articles, the results of the integrative literature review are presented in Table 1.

Table 1. Summary of the results of the analyzed articles.

Authors/Method/ Level of evidence	Objective/Participants	Intervention/Phenomena of interest	Results	Study limitations
<p>Authors: Ganjalkhani, Tirgari, Rashatabadi and Shahesmaeili [8]</p> <p>Method: Assay Controlled and Randomized Clinic</p> <p>Level of evidence: II</p>	<p>Objective: - To determine the effect of structured teaching on stoma care, QoL and anxiety of the ostomized patient</p> <p>Participants: -The participants were 60 patients with permanent ostomy</p>	<p>- In the intervention group (30 individuals), a nurse specialized in stoma therapy, conducted a focused and structured education session, with oral and practical information aimed at self-care of the ostomized person. At the end of it, she distributed a brochure with information about the lifestyle of the person with ostomy</p> <p>-The group in question also participated in a practical session, in which the properties of healthy skin and the care that should be provided to it and the change of the devices were addressed. In the control group (30 people), routine care was provided, and the patients did not receive a structured education from the nurse</p>	<p>-Regarding QoL, after the intervention, the values obtained from the questionnaire showed that the intervened group presents marked positive changes, with a higher QoL value than the control group</p> <p>-In addition to the anxiety, the results obtained show that the average levels of anxiety decreased significantly in the intervention group. In contrast, in the control group the levels remained the same</p>	<p>- Low number of participants</p>

(continued)

Table 1. (continued)

Authors/Method/ Level of evidence	Objective/Participants	Intervention/Phenomena of interest	Results	Study limitations
<p>Authors: Forsmo, Pfeffer, Rasdal, Sintonen, Komer and Erichsen [9]</p> <p>Method: Randomized controlled clinical trial</p> <p>Level of evidence: II</p>	<p>Objective: - To determine the effect of an improved recovery program, in the following dimensions: Hospital stay time; Stoma related complications; HQRoL</p> <p>Participants: - Included were 122 patients submitted to a planned stoma, of which 61 were part of the intervention group, and the remaining 61 were the control group</p>	<p>- The patients in the intervention group were submitted to one or two appointments of 40 to 60 min before the surgery. The consultations, based on an improved recovery program, and performed by specialist nurses, focused on counseling and education about the stoma</p> <p>- Education includes: explanation of the part of the intestine that should be removed and the possible consequences; viewing pictures of a stoma; explanation of the function of the stoma equipment, its impact on relationships, sexuality, and daily activities and changes in self-care; demonstration of how to place the device and where to buy it</p>	<p>- The results of this study showed that, through an intervention focused on a structured education and guidance plan, in the pre-surgical phase, patients stay less days in hospital after surgery Specifically, the postoperative period of the intervention group lasted, on average, five days, while the control group lasted for nine days</p> <p>- In the present study, it was also identified that the intervention in question is associated with a lower percentage of stoma related complications</p> <p>- Besides the results already mentioned, in this study no differences in HQRoL values were found between the two groups evaluated</p>	<p>- This study did not measure the days it takes the patient to be independent and proficient in stoma care</p> <p>- Insufficient proficiency prolongs the duration of hospitalization</p>

(continued)

Table 1. (continued)

Authors/Method/ Level of evidence	Objective/Participants	Intervention/Phenomena of interest	Results	Study limitations
<p>Authors: Hughes, Cunningham and Yalamarthy [10]</p> <p>Method: Study Cohort Prospective Level of evidence: IV</p>	<p>Objective: - Compare the impact of stoma skills training in the preoperative period, with training only from the post-surgical phase Participants: - In this study, 173 patients proposed for surgery with ostomy formation participated, integrated in an improved recovery program (ERAS)</p>	<p>- 173 patients, with 53 practiced stoma care in the preoperative phase, while the remaining 120 did not, i.e., only started training in the postoperative period</p>	<p>- In this study, no significant differences were observed both in the incidence of complications related to the stoma and in the number of readmissions concerning it. However, it was possible to find that the group subject to the practice of stoma care showed fewer general complications, although the results were not statistically relevant - The average length of stay in the hospital was considerably shorter in the group that practiced ostomy, corresponding to an average of 6 days of hospitalization compared to the 9 days of stay of patients who did not train</p>	<p>- The length of stay was the main measure of result, discarding other possible results - The study did not include factors such as cognitive and/or physical impairment, which may contribute to a delay in self-care of the stoma, and therefore increase the length of hospitalization</p>

(continued)

Table 1. (continued)

Authors/Method/ Level of evidence	Objective/Participants	Intervention/Phenomena of interest	Results	Study limitations
<p>Authors: García-Goni [7]</p> <p>Method: Case-control study</p> <p>Level of evidence: IV</p>	<p>Objective: - Analyze HQRoL and the cost-effectiveness of hospitals with and without specialist nurses in stoma care</p> <p>Participants: - Included were 392 patients with programmed ostomy, admitted to one of 160 hospitals in Spain</p>	<p>- Of the 392 patients, 313 were admitted to a hospital with specialist stomach nurses (Group I), and the remaining 39 to a hospital without specialist stomach nurses (Group II)</p>	<p>- The results of the study show that in the first two weeks, group one had more complications than group two. However, these complications decreased over time, faster in the first group than in the second. Consequently, the demand for care in the health services in order to resolve the complications associated with the stoma was reduced over time in group I, unlike group II, which was increasing</p> <p>- Regarding cost-effectiveness, Group I presented a significantly lower average cost than Group II. Finally, along with HQRoL, it was observed that there is a more relevant evolution in group I, especially regarding the performance of usual activities</p>	<p>- It is an observational, non-randomized study, and therefore presents different response variables in both groups. The author also considers that there may be variables that were not analyzed</p>

(continued)

Table 1. (continued)

Authors/Method/ Level of evidence	Objective/Participants	Intervention/Phenomena of interest	Results	Study limitations
<p>Authors: Danielsen, Burcharth and Rosenverg [11] Method: Systematic review of descriptive and qualitative studies Level of evidence: V</p>	<p>Objective: - To evaluate the effects of education of ostomized patients on their quality of life - To determine the profitability of the education of people with ostomy Sample: Review of 7 articles focused on the education of the ostomized patient</p>	<p>- Not applicable</p>	<p>- Some of the articles included in the review, highlight the importance of integrating the person with ostomy into a recovery program in the preoperative phase. The same contributes to a marked decrease in the meantime of hospitalization, as well as readmissions due to complications related to the stoma. Education and training integrated in a preoperative preparation plan, lead to the person being proficient in stoma management, faster - Regarding the immediate postoperative period, the education and training of the ostomized patient, translates into a significant increase in competence for self-care (in the six domains), self-efficacy and self-management - Finally, some studies compare the “cost-effectiveness” of patients educated through a multimedia educational program, compared to conventional education*. In this regard, they concluded that people submitted to the former receive more effective, and thus less costly, interventions in the long run</p>	<p>- They are based on the heterogeneity and scarcity of published data regarding the education of the patient, and the formation of people with ostomies - Most of the studies included, have little scientific rigor and are not clear either in the description of the interventions or in the results obtained</p>

(continued)

Table 1. (continued)

Authors/Method/ Level of evidence	Objective/Participants	Intervention/Phenomena of interest	Results	Study limitations
<p>Authors: Schwartz and Sá [12]</p> <p>Method: Integrative literature review</p> <p>Level of evidence: VI</p>	<p>Objective: - To determine the impact of the educational action in the pre-operative phase, in the ostomized patient</p> <p>Sample: - Review of 6 articles focusing on self-care and adaptation to the intestinal stoma by the patient</p>	- Not applicable	<p>- Some studies have highlighted the preoperative educational action of the ostomized patient, as an essential contribution for his readaptation to his new condition. One of the articles describes that the education performed by nurses based on the explanation of the surgical procedure, as well as the care to be developed through the presence of an ostomy, enlightens the patient, decreasing his anxiety and anguish, which, in turn, makes the individual more receptive to the teachings. This fact positively influences the learning process, thus contributing to a better adaptation of the patient</p>	- Not mentioned

5 Discussion

Through the analysis of the considered articles, it was possible to verify that all of them highlight the importance of education of the ostomized patient in the preoperative phase. Its benefits are presented in Table 2.

Table 2. Benefits of nursing educational intervention.

Decrease in length of stay after OEI [9–11]
Decrease in long-term complications with ostoma [7, 9, 11]
Improvement of HRQoL [7, 8, 11, 12]
Better cost-effectiveness [7, 11]

Regarding the duration of hospitalization, the formation of an OEI, through the surgical treatment of the CCR, contributes to a longer hospitalization, and therefore, the education of the patient who will undergo the procedure in question is recommended. Although there is not a consensus about the benefits of nursing interventions in the ostomized person, three of the five studies analyzed, show that a plan of education and orientation structured and focused on the person, in the preoperative period, reduces the length of hospital stay of the individual, after surgery [9–11, 13].

In his systematic review, Danielsen *et al.* [11] describes that the integration of the patient in an “Enhanced Recovery Program” considerably reduces the length of stay in the postoperative period. Following this line of thought, with an ERP focusing on information and education of the patient throughout the perioperative period, the educational intervention is a major factor in the length of hospitalization. Thus, the nursing care, with focus on teaching and transmission of knowledge to the patient, increase the probability of the patient to have an earlier hospital discharge [9, 10].

Regarding complications related to the stoma, according to the article by Forsmo *et al.* [9], a DBE performed by specialized nurses, contributes to a significant decrease in complications related to the stoma. In their study, the percentage of complications differed between the two groups analyzed, affecting 51% of patients undergoing conventional stoma education, and 38% of those who were integrated into a DBE, or 15% less than the control group.

In this register, along with an article included in the review by Danielsen *et al.* [11], in which structured education is compared with conventional education, it is concluded that the former contributes to a decrease in readmissions due to complications associated with the stoma. Even if in this study, the statistical results have not indicated a marked disparity of results between the two types of teaching, it is more evident that an ERP has more benefits for the patient with respect to complications related to the stoma. Despite the effectiveness of an ERP, Goñi *et al.* [7], in his study, only emphasizes the importance of a teaching carried out by nurses specializing in stoma therapy, rather than patient education by nurses without expertise in stoma care. The first, focused on the individual health of the patient and seeking to establish a relationship of partnership with the patient,

aims to improve communication between the people involved (nurse/patient/family), and thus contribute to their learning process and self-management.

In the follow-up, Goñi *et al.* [7] recorded that after two weeks, 38.02% of the individuals submitted to a specialized teaching (group I) had complications, while in the group without specialized care (group II), only 25.86% had adverse effects. Even so, these results were quickly inverted, since over three months the number of complications decreased rapidly in group I, unlike group II, which was increasing more and more. This event refers to the hypothesis that patients with access to educational interventions by specialist nurses in stoma therapy are more adapted to their ostomy.

With regard to Health-Related Quality of Life (HRQoL), Ganjalikhani [8] based his intervention on care provided by specialist stomach nurses. Specifically, the specialized teaching, sought to provide oral information and structured practices on ostomy, and at the same time, training with patients in stoma care, in order to promote their autonomy and self-care. Through the observation of this intervention group, and in comparison with the control group, the author concludes that, the educational actions that provide an increase in knowledge and that are focused on the psychological and social needs of individuals, reduce feelings of stress and anxiety. Considering these as dimensions that integrate HRQoL, an improvement in QoL is observed. The results showed that the intervention group showed a considerable increase in psychosocial behaviors, resulting in an increase in QoL value, namely 229.9 and 202.7 in the intervention and control group, respectively.

This panorama was also studied and evaluated in Goñi *et al.* article [7], according to which, also the group submitted to training by nurses specializing in stoma care, showed a higher value of HRQoL.

The structured education of the patient, by increasing the levels of knowledge about the stoma, contributes to the clarification of countless doubts about it, resulting from the entire clinical situation that has been imposed on it. In this way, the person feels more confident about his condition, becoming more receptive to the teachings, which, in turn, contributes to an increase in self-management and self-efficacy. Finally, as the individual gains knowledge and confidence to take care of his or her stoma, he or she adapts to his or her condition. That said, it is possible to admit that an education oriented and focused on the ostomized patient, promotes his or her process of readaptation, a premise that is essential for a quality experience [11, 12, 14, 15].

As for obtaining a cost-effectiveness, this is an aspect that is indirectly related to the competence for the self-care of the patient. As has been described, a structured education focused on the patient, conducted by nurses' specialists in stomach therapy, contributes to an increase in their level of knowledge, which in turn, considerably favors the development of skills related to self-care to the stomach, this aspect is necessary for acceptance and consequent adaptation to the new reality. As mentioned above, an adjustment of the individual to his ostomized condition is associated with a lower incidence of complications related to the stoma, in the long term, leading to a reduced demand for health services and, consequently, a lower number of readmissions due to complications with ostomy [7, 11, 16, 17].

Thus, it was found that an intervention of nurses specialized in stoma care, based on the transmission of information and training of the patient to care for himself, not only

corresponds to a more effective intervention, but also less expensive over the long term [2, 7, 18–21].

6 Conclusion

The articles analyzed do not specify an age group, thus covering anyone, specifically the older population.

The six studies selected and later analyzed, evidence the importance of an educational intervention in the adaptation process of the ostomized person. Most of them are centered in a structured education, conducted by specialist nurses, concluding that it becomes more beneficial to the patient, rather than a conventional education.

The transmission of knowledge, the development of a therapeutic relationship between all those involved (nurse/patient/family) and the practice of actions aimed at self-care contribute, among many other aspects, to an understanding and acceptance of the chronic condition to which the individual has been subjected, i.e., intervention based on education promotes positive changes in the older adult. In addition, these changes have a positive impact on several dimensions that relate to each other.

Through this systematic review of the literature, it was possible to conclude that self-care interventions promoting positive changes in the older adult with ostomy of intestinal elimination, in the pre-surgical phase, produce benefits in several aspects, such as: length of stay; complications with the stoma; HRQoL; Cost-effectiveness.

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Factors Influencing the Gains Sensitive to Rehabilitation Nursing Care in Empowering the Dependent Person in Self-care in the Home Setting: A Systematic Review of the Literature

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Abstract. Dependence on self-care has had a major impact on the financial, social, and health model of the population. The specialist nurse in rehabilitation nursing should direct his/her action by promoting meaningful learning and providing adaptive strategies to make the person as independent as possible in performing his/her life activities, thus promoting self-care. In this sense, it is important to identify the factors that influence the gains that are sensitive to rehabilitation nursing care in empowering the dependent person in self-care at home, with a view to improving and satisfying the care provided.

Objective: To identify which factors influence the gains that are sensitive to rehabilitation nursing care in empowering the dependent person in self-care in a home setting.

Methodology: The search was conducted through the EBSCOHost. Platform, where it was possible to access the following databases: CINAHL Plus with full text and Psychology and Behavioral Sciences Collection. To define the research question, the PICO methodology was followed.

Results: The factors identified are related to health professionals' knowledge and skills, care planning and decision making, person-centered care, social and environmental conditions of the patient/family, and gaps in transitional care.

Conclusions: The empowerment of the dependent person on self-care at home should take into account the identified factors in order to obtain gains sensitive to rehabilitation nursing care.

Keyword: Rehabilitation Nursing · Gains Sensitive to Rehabilitation Nursing Care · Self-Care · Home Care

1 Introduction

The changes in society and the improvement in the living conditions of the population had a great impact on health gains, generating greater longevity and, consequently, an increase in the aging population [1]. According to data from the National Institute of Statistics, the Portuguese population is getting older. In 2021, for every 100 young people, there will be 182 elderly people, while in 2011, for every 100 young people there will be 128 elderly people [2]. In this sense, the World Health Organization estimates that by the year 2050 the number of people over 60 will triple [3].

Aging is a natural phenomenon that affects all individuals [4]. Morphological, functional, biochemical, and psychological changes occur with aging, as well as the loss of the individual's ability to adapt to the environment, and a higher prevalence of pathological processes [1]. However, some studies identify an association between a worse functional profile and being a woman, having low literacy, the presence of multimorbidity, being institutionalized and having cognitive deficits [5–7]. In this sense, older people require a person-centered care model aimed at health promotion and prevention of complications associated with aging [8]. This care model should take into account shared decision-making, the establishment of individual goals, the person's specific needs, and family involvement in care, using a case management methodology and systematic person-healthcare professional feedback [9, 10].

Faced with an aging population and an increase in the number of chronic diseases, professionals are challenged to understand the factors underlying these phenomena and rethink intervention models that are more adjusted to individuals [11]. In this sense, rehabilitation nursing should focus its activities on promoting meaningful learning and providing adaptive strategies to make the person as independent as possible in performing his/her life activities, thus promoting self-care [12]. It is important to take into account not only the physical component but also the psychological one, since depression rates are very high in older people, with an increase after the beginning of the pandemic [13].

The Self-Care Deficit Nursing theory developed by Dorothea Orem in 1967 and first published in 1971 encompasses three interrelated theories: the Self-Care Deficit theory, the Self-Care theory, and the Nursing Systems theory [12]. Orem [14] defines self-care as "(...) an action deliberately performed by people to regulate their own functioning and development (...) Those are actions performed to ensure the provision of requirements to continue with life (...)".

However, dependency can be defined as: "(...) lack or loss of physical, psychological or intellectual autonomy, resulting from or aggravated by chronic disease, organic dementia, post-traumatic sequelae, disability, severe and or incurable disease in advanced stages, absence or scarcity of family or other support, is unable, by himself, to perform the activities of daily living. [15]. Nevertheless, dependence is not only a result of the aging process but can also be related to other factors, such as congenital or acquired disabilities, oncological and degenerative diseases, work accidents, or even sequelae of traffic accidents [16].

The phenomenon of dependence on self-care has had a major impact on the financial, social, and health models of the population. In response to these challenges, health and social support policies have focused their actions on accountability, awareness, the

involvement of families in activities that promote self-care, and the search for more effective health behaviors in the management of health-illness processes [12].

Nursing theories have always described that the focus of nurses' professional action is the promotion of self-care independence. In this sense, and given the permanent or temporary absence of functional capacity, nurses should focus their activities on promoting the relatives/caregivers' skills so that they can respond in an adjusted way to the needs of dependent members [12], taking into account that home is the right place for human beings to develop and maintain a permanent balance and well-being [12, 17].

However, the objective of this systematic literature review is to identify the factors influencing the gains sensitive to rehabilitation nursing care in the empowerment of dependent people in self-care in home settings. In this sense, the research question was formulated, following the PICO (Participant, Intervention, Comparison, Outcomes) methodology: What factors influence the gains sensitive to rehabilitation nursing care in the empowerment of the person with dependence in self-care in a home setting?''.

2 Methodology

The search was conducted through the EBSCOHost - Research Databases platform in September 2022. Through this platform, it was possible to access the following databases: CINAHL Plus with Full Text; MEDLINE with Full Text, and Psychology and Behavioral Sciences Collection. The descriptors used were caregivers, care homes, client-centered care, domiciliary care, informal caregivers, family members, nursing homes, patient-centered care, and rehabilitation. All descriptors were validated in MeSH (Medical Subject Heading) and CINAHL Subject Headings. The Boolean operators used were "AND" and "OR". The results obtained were limited using inclusion criteria: full text, English language, and articles with a publication date between January 2017 and September 2022.

The search resulted in a total of 127 articles. After the analysis of the results, it was observed that 4 of these articles were duplicates. After reading the title and the abstract, 110 articles that did not fit the theme under study were eliminated, resulting in only 13 articles for the reading of the remaining text.

After reading and analyzing the full text, 7 articles were selected to be included in this systematic literature review. In a systematized manner, the flowchart in Fig. 1 demonstrates all the phases of the research performed.

The articles were subjected to Joanna Briggs Institute (JBI) methodological quality assessment, meeting more than 50% of the proposed quality criteria [18]. The levels of evidence were classified according to Melnyk & Fineout-Overholt [19].

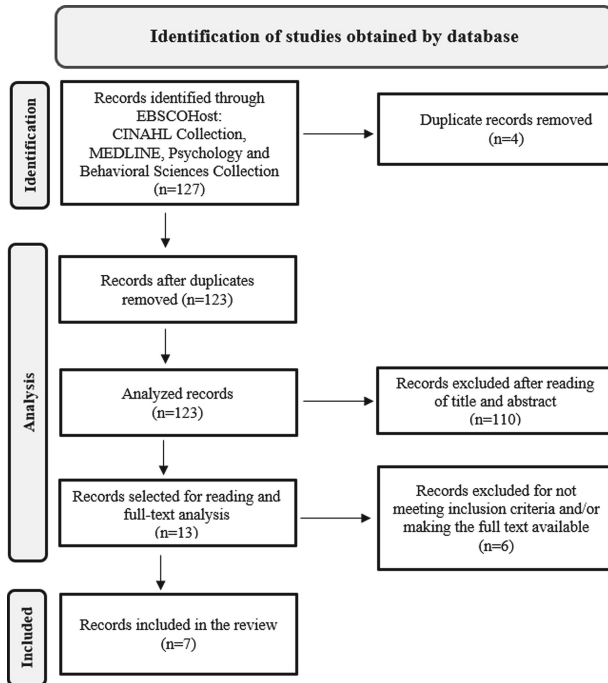


Fig. 1. PRISMA-type research methodology

3 Results

Table 1 shows the results obtained from the analysis of the selected articles.

Table 1. Summary of the analyzed articles

Authors/ Year/ Title	Objectives	Results/Conclusions
Participants		
Methodology/		
Level of Evidence		
<p>Gustafsson, et al (2019): ‘Best fit’ caring skills of an interprofessional team in short-term goal-directed reablement: older adults’ perceptions</p>	<p>Identify what skills are needed in a multidisciplinary team in achieving better results in the delivery of short-term rehabilitation care</p>	<p>-According to the participants, the skills that are needed in a multidisciplinary team in achieving better results in the provision of short-term rehabilitation care are: a motivating caregiver, a caregiver who creates a positive atmosphere, a caregiver who is oriented towards human companionship, a caregiver who goes beyond what is expected;</p>
<p>23 people aged 65 or more</p>		<p>-These caregiving skills can be seen as core nursing competencies;</p>
<p>Qualitative study/ Level VI</p>		<p>-The provision of rehabilitation care at home is an important area that should be recognized by health care professionals as well as health care managers;</p> <p>- Goal-oriented rehabilitation may contribute to improved care and expected outcomes in the recovery of the elderly.</p>
<p>Bölenius, et al (2017): Effects and meanings of a person-centred and health-promoting intervention in home care services - a study protocol of a non-randomised controlled trial</p>	<p>Evaluate the effects and meanings of the health-promoting, elderly-centered intervention at home</p>	<p>-Current home care services are very task-focused and have several shortcomings, including not meeting the psychosocial needs of the elderly and very limited planning, decision making, and care delivery;</p> <p>-Person-centered care has been shown to improve satisfaction with care and quality of life for older adults.</p>
<p>270 elderly aged >65 years receiving home care services, 270 relatives, and 65 employees. The control group contains the same number of members and is equally distributed.</p>		

(continued)

Table 1. (continued)

Non randomized controlled trial/ Level III		
Parmar, et al (2022): Optimizing the integration of family caregivers in the delivery of person-centered care: evaluation of an educational program for the healthcare workforce	Evaluating the mixed methods of a competency-based education program for health professionals who interact and work with family caregivers	<ul style="list-style-type: none"> -The education program had an immediate effect on increasing students' knowledge and skills for working with family caregivers; -Students became more confident and comfortable supporting family caregivers; -Students reported improvements in communication, assessing support needs, and helping family caregivers navigate health and community systems; -This study provides a basis for educating healthcare professionals to provide person-centered care and include family caregivers as care partners, assisting them to maintain their own well-being.
Mostly health care employees (68.1%) and health care students (21.4%)		
Qualitative study/ Level VI		
Jones, et al (2022): Patient Perspectives on Care Transitions From Hospital to Home	Identify gaps perceived by users during their transition of care experiences, including post-discharge follow-up.	<ul style="list-style-type: none"> - The gaps identified by users in the care transition processes are related to follow-up phone calls, scheduling appointments and their transportation, the provision of important contacts, delivery of medical equipment to the home, and differences in follow-up for black users; -There are several opportunities for improvement related to user-identified gaps; -Identification of user-perceived gaps during the care transition process may help hospitals and physicians tailor their care transition interventions to users' specific needs.
1257 service users aged ≥ 18 years who have been admitted to any of the 17 hospitals, 12 professional organizations, or 6 skilled nursing facilities in Michigan and have been recently discharged to home or assisted living facility with a diagnosis of congestive heart failure or chronic obstructive pulmonary disease		

(continued)

Table 1. (continued)

<p>Opinion Article/Level VII</p>		
<p>Giosa, et al (2021): Person- and family-centred goal-setting for older adults in Canadian home care: A solution-focused approach</p> <p>People aged >65 years</p> <p>Qualitative study/ Level VI</p>	<p>Determine how goal-setting practices can be guided taking into account the individual, goals, perceived needs and preferences</p>	<p>-Participants identified four important competencies in professionals: (1) seeing beyond age; (2) relational communication; (3) doing 'with' rather than 'for'; (4) participation and collaboration in the care planning process;</p> <p>-Elderly people and their caregivers want to be more involved in the care planning process to ensure that their preferences, needs, and personal history are included;</p> <p>-The solutions suggested by seniors and caregivers in this study are consistent with recommendations for applying person- and family-centered care.</p>
<p>Piculell, et al (2020): A concept analysis of health communication in a home environment: Perspectives of older persons and their informal caregivers</p> <p>No participants</p> <p>Systematic Literature Review/ Level I</p>	<p>To identify and construct the meaning of health communication from the perspective of the elderly and their informal caregivers who require care at home</p>	<p>-The advantages of health communication are related to the management of the recipient's resources, in the decision-making process, and personalized information and support deliveries;</p> <p>-The home environment influences health communication due to the habits and interactions that the elderly have towards their informal caregivers;</p> <p>-Technology-assisted health communication may facilitate understanding of information. but can also be considered a barrier. when the information provided is excessive or irrelevant;</p> <p>-Health communication has been shown to contribute to the improvement of care for the elderly at home</p> <p>.</p>

(continued)

Table 1. (continued)

Shahsavari, et al (2018): Transitional care: Concept analysis using Rodgers' evolutionary approach	Define the concept of transitional care, considering its application in different studies and changes over time	-The concept of transitional care is a systematic care process involving the service user, his/her relatives, and the various elements of the multidisciplinary team; -The concept of transition care is not only limited to the care provided to patients by nurses at discharge; -For the implementation of the concept of transition care, it is necessary to take into account several factors, namely the conditions of the service user and his/her family members, the participation of the different elements of the multidisciplinary team, the environmental conditions, and the social support.
No participants		
Systematic Literature Review/ Level I		

4 Discussion

In the study by Gustafsson, et al. [20] 23 elderly people were interviewed who, after a period in the hospital, were provided with goal-oriented rehabilitation care. By conducting these interviews it was possible to describe how the participants lived their experience and to identify the skills that are necessary for a multidisciplinary team as success factors in obtaining short-term results. From the analysis of the results, it was possible to identify four skills: 1st) a motivating caregiver, 2nd) a caregiver who creates a positive atmosphere, 3rd) a caregiver who is oriented toward human companionship, and 4th) a caregiver who goes beyond what is expected. These caregiving skills can be seen as core nursing competencies.

In the study conducted by Bölenius, et al. [21] 270 elderly people were invited to form an intervention group and another 270 elderly people were invited to form a control group. In addition to the elderly, one family member from each selected element, 65 employees were invited to participate in the intervention group and another 65 employees were invited to participate in the control group. The different groups were selected from two different cities in a county in northern Sweden. Both cities have similar organizations, in terms of working conditions, staff skill mix, and educational levels. With this study, it was possible to evaluate the effects and meanings of an elderly-centered, health-promoting home-based intervention.

Current home care services are very task-focused and have several shortcomings, namely not meeting the psychosocial needs of the elderly and very limited planning, decision-making, and care provision [22–24]. In this sense, Bölenius, et al. [21] argue that care provision and decision-making should be planned and person-centered, taking into account the needs expressed by the elderly, thus allowing for greater control over

their own health. In this sense, this intervention will allow the elderly and their families, together with the nurse, to dialogue and prioritize the contents of care that can meet the psychosocial, physical, and functional needs of the elderly [21].

Thus, from the study conducted by Bölenius, et al. [21] we can conclude that person-centered care is shown to improve satisfaction with care and quality of life in the elderly. However, Gustafsson, et al. [20] argue that goal-oriented rehabilitation care contributes to improved care and expected outcomes in the recovery of the elderly.

Parmar, et al. [25] argue that health professionals should have knowledge and skills to support family caregivers. In this regard, Parmar, et al. [25] applied a competency-based education program for healthcare professionals who interact and work with family caregivers. The participants in this study were mainly healthcare workers (68.9%) and trainees (21.7%), representing 5 professional categories in healthcare.

The education program consisted of the presentation of six modules that followed the domains of the competency framework. Its application had an immediate effect in increasing the students' knowledge and skills for working with family caregivers [25].

Participants reported becoming more confident and comfortable supporting family caregivers and reported improvements in communication, assessing support needs, and helping family caregivers navigate health and community systems [25].

Thus, this education program provides a basis for educating health professionals to provide person-centered care, including family caregivers as partners in care, helping them to maintain their own well-being [25].

In the study conducted by Jones, et al. [26] it was possible to identify the gaps perceived by service users during their transition of care experiences, including post-discharge follow-up. The participants were 1257 service users aged 18 years or older who had been admitted to some of the 17 hospitals, 12 professional organizations, or 6 skilled nursing facilities in Michigan and had recently been discharged to their homes or assisted living facility with a diagnosis of congestive heart failure or chronic obstructive pulmonary disease. These participants identified several gaps in the transition processes, including follow-up phone calls, scheduling appointments and their transport, providing important contacts, delivering medical equipment to the home, and differences in follow-up care for black patients. In the face of identifying these gaps, hospitals and physicians must tailor their care transition interventions to the specific needs of users [26]. However, Shahsavari, et al. [27] argue that the implementation of the concept of transitional care should take into account several factors, including the conditions of the service user and his/her family members, the participation of the different members of the multidisciplinary team, the environmental conditions, and the social support, which is in line with the aforementioned study.

The study conducted by Giosa, et al. [28] allowed for the determination of how practices in goal setting can be guided taking into account the individual, goals, needs, and their preferences. Participants were recruited through community advertisements in a region of Ontario in Canada and included 13 people over the age of 65 and 12 family/friend caregivers. Interviews were conducted, in which participants identified four essential competencies in caregivers: 1st) seeing beyond age, 2nd) relational communication, 3rd) doing 'with' rather than 'for' and 4th) participation and collaboration in the care planning process. In this sense, older adults and their caregivers wish to be more

involved in the care planning process to ensure that their preferences, needs, and personal history are taken into account, as advocated by the studies conducted by Bölenius, et al. [15] and Gustafsson, et al. [20].

Health communication is a rapidly growing field of research that identifies communication as an intervention to improve health outcomes [29]. The concept of health communication is multidisciplinary and has been influenced by various fields such as health education, medicine, psychology, marketing, and social sciences, contributing to various definitions [30, 31].

In this sense, Piculell, et al. [32] conducted a systematic literature review that aimed to identify and construct the meaning of health communication from the perspective of the elderly and their informal caregivers who require care at home. For this review, 29 articles were analyzed. For data analysis, a collection of phrases, words, or excerpts from the studies were grouped as surrogate terms and related concepts, attributes, references, antecedents, or consequences. From this study, we can conclude that health communication has been shown to contribute to the improvement of care for the elderly at home. The study by Giosa, et al. [28], argues that relational communication should be taken into account when providing care.

However, the home environment can influence health communication due to the habits and interactions that the elderly have toward their informal caregivers [32, 33]. However, Gustafsson, et al. [20] state that the provision of rehabilitation care at home is an important area that should be recognized by care providers as well as health care managers.

Health communication with the aid of technology can facilitate the understanding of information, but can also be considered a barrier when the information provided is excessive or irrelevant [32, 34].

Transitional care is increasingly recognized as a useful care delivery model. But despite the widespread use of transitional care, this concept still lacks clarity [27]. Thus, Shahsavari, et al. [27], through a review of the literature, defined the concept of transitional care, considering its application in different studies and changes over time. In this study, 46 articles were analyzed and the results were grouped into antecedents, attributes, and consequences. From the analysis of the various articles, Shahsavari, et al. [27], concluded that the concept of transitional care is a systematic care process involving the patient, his/her family members, and the various elements of the multidisciplinary team.

With the analysis of the articles obtained, the factors that influence the gains sensitive to rehabilitation care in the empowerment of the dependent person in self-care in the home setting were identified and are summarized in Table 2.

Table 2. Identification of the factors that influence the gains sensitive to rehabilitation care in the empowerment of the dependent person in self-care in home settings

Author/Year/Article Title	Identification of the factors that influence the gains sensitive to rehabilitation care in the empowerment of the dependent person in self-care in home settings
Gustafsson, et al. (2019): ‘Best fit’ caring skills of an interprofessional team in short-term goal-directed reablement: older adults’ perceptions	-Caregiver competencies: 1) Being a motivating caregiver; 2) Being a caregiver who creates a positive atmosphere; 3) Being a caregiver oriented to human companionship; 4) Being a caregiver who goes beyond what is expected
Bölenius, et al. (2017): Effects and meanings of a person-centred and health-promoting intervention in home care services - a study protocol of a non-randomised controlled trial	-Care planning; -Decision-making process; -Providing person-centered care
Parmar, et al. (2022): Optimizing the integration of family caregivers in the delivery of person-centered care: evaluation of an educational program for the healthcare workforce	-Knowledge of health professionals; -Health professionals’ skills
Jones, et al. (2022): Patient Perspectives on Care Transitions From Hospital to Home	- Gaps in the transition processes: follow-up phone calls, scheduling appointments and their transport, the provision of important contacts, delivery of medical equipment to the home, and differences in the follow-up of black users
Giosa, et al. (2021): Person- and family-centred goal-setting for older adults in Canadian home care: A solution-focused approach	- Competencies of health professionals: 1) Seeing beyond age 2) Relational communication; 3) Doing ‘with’ rather than ‘for’; 4) Participation and collaboration in the care planning process
Piculell, et al. (2020): A concept analysis of health communication in a home environment: Perspectives of older persons and their informal caregivers	-Communication in health; -Use of technology
Shahsavari, et al. (2018): Transitional care: Concept analysis using Rodgers’ evolutionary approach	-Conditions of the patient and his/her family members; -Participation of the different elements of the multidisciplinary team; - Environmental conditions; - Social support

5 Conclusions

In the studies analyzed, several factors were identified as influencing the gains that are sensitive to rehabilitation care in empowering the dependent person in self-care at home. Thus, the provision of rehabilitation nursing care at home should take into account these factors with a view to improving and satisfying the expected care and results.

Transition of care is a systematic care process involving the patient, the family and the various elements of the multidisciplinary team, and this concept is not only limited to the care provided by nurses to patients at discharge. In this sense, primary health care is a community resource that ensures adequate continuity of care in the home/family context. However, there are several gaps in the transition processes that should be improved.

The provision of rehabilitation care at home is an important area that should be recognized by caregivers as well as health care managers. In this sense health professionals must have the knowledge and skills to support family caregivers.

Person-centered and goal-oriented rehabilitation care contribute to improved care, expected outcomes, as well as improved satisfaction with care and quality of life for clients/family.

It is proposed that further studies be conducted on the topic of transition of care from hospital to home, particularly in the process of dependent empowerment for self-care.

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The Quality Indicators of Long-Term Care Models that Promote Empowerment for Self-care: A Systematic Review Protocol

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Abstract. Aim: The accelerated ageing of the population and the prospect of a world with a high proportion of older adults needing multiple responses is a challenge for health and social services. The phenomenon of population ageing translates into a significant increase in older adults and a decrease in the young population: in 2021, there would be 182 older adults for every 100 young people. Alongside ageing, multiple diseases and loss of functionality may arise, affecting the independence and self-care capacity of older adults. Empirically, institutionalisation leads to barriers in functionality, resulting from multiple emotional, physical and cognitive factors. Residential homes for older adults respond to institutionalisation and are often considered a predictor of dependency. Considering all the aspects previously explained, it becomes necessary to look at the quality of care in long-term care facilities and the models of care used in these elderly care facilities. Studies indicate that the assessment of the functional profile and self-care needs is crucial in the development of care models. **Methods and design:** A systematic literature review will be conducted. The following databases will be searched: CINAHL Plus with Full Text, MedicLatina, MEDLINE with Full Text, and Psychology and Behavioral Sciences Collection. The search strategy will include the following MesH or similar terms: Functional Profile, Self-Care, Older Persons, and Long-Term Care. The research will meet the timeline of January 2017 to August 2022. As inclusion criteria, only randomized studies with people aged 65 years or older with long-term care needs, written in English and Portuguese, will be included. **Conclusion:** This systematic literature review will allow us to identify indicators of the quality of long-term care, thus contributing to a better quality of life for the population.

Keywords: Long-term care · Person-centred care · Models of care

1 Introduction

The ageing process is a worldwide phenomenon marked by specific biopsychosocial changes that occur throughout the life cycle [1–3]. It is a unique process for each person,

influenced by genetic and physiological changes, lifestyles, environmental characteristics and nutritional status [4]. The ageing process reveals weaknesses, imbalances and disabilities, some serious, often caused by worsening health status [5, 6]. With advancing age, there is a greater risk of developing chronic and degenerative diseases, which account for more than 50% of the individual's overall disease burden, requiring extensive care services [7–9].

As a result of the combination of the person's functional dependency, the decline in functional profile, the need for care, and the capacity of the caregiver, there is an imbalance between the care needs and the necessary and appropriate responsiveness in the family context. This often leads families to request formal social sector care - Long Term Care [7, 8, 10].

This type of care response is essential and should be reorganised in terms of the quality of services because, in fact, people experience different levels of autonomy throughout their lives, facing events that cause dependency [11]. During their growing up years, they acquire skills to be autonomous and develop self-care abilities [8, 10, 12]. At certain times, in a deteriorating situation of the human condition, particularly in acute illness conditions, the individual's self-care capacity is compromised, which gives rise to the inability to care for oneself, requiring self-care agents [10].

The assessment of health status is an essential indicator in determining care needs. Regarding this topic, the scientific literature suggests the assessment of several items in addition to the number of chronic diseases, such as self-perception of health status, limitations in basic and instrumental activities, and mental health status [3, 13–18]. Thus, the health and functional status of people aged 65 years or more cannot be characterised only by the presence or absence of disease, but by the appreciation of all circumstances that interfere with their well-being and functioning.

Some research studies report the benefits that integrated care models have had in improving the quality of life and functionality of people with multimorbidity and frailty [4, 13, 19, 20] namely: (i) reduction of hospitalisation and readmission rates [21](ii) in the reduction of polypharmacy [2, 22, 23]and (iii) in the improvement of patient satisfaction with perceived access to and quality of care [13].

In this sense, the construction of knowledge on the quality indicators of long-term care models is extremely relevant as it will allow demonstrating the existence of models that promote the empowerment for self-care with regard to long-term care.

Therefore, with this protocol, the authors intend to specify the conditions to initiate this review ensuring the rigour, clarity and quality of the whole process. To this end, two reviewers will be involved in the multiple phases of study identification and selection and in the task of searching different databases. As a result of this systematic review, the authors believe to ensure a significant contribution in identifying guidelines for practice based on scientific production and informing potential guidelines for future research. Finally, this study aims to identify the quality indicators of long-term care models and how they promote self-care training for people aged 65 years and older.

2 Objective

This study aims to determine the quality indicators of long-term care models and, how they promote self-care training for people over 65 years of age. This study aims to identify which are the quality indicators of long-term care and which promote self-care.

3 Methods and Design

This article presents the protocol of a systematic literature review. By choosing this method to produce knowledge, the aim is to obtain data based on scientific evidence.

The systematic review protocol presented in this article uses a detailed search strategy focused on a central question about quality indicators and models of long-term care that promote empowerment for self-care. This protocol was developed following the Preferred Articles for Systematic Reviews and Meta-Analyses (PRISMA) [24]. It was registered in the International Prospective Register of Systematic Reviews (PROSPERO) under registration number CRD42022348671.

Since there is already a considerable amount of scientific production on this topic, it was decided to choose only randomised studies.

The study protocol was prepared and registered in August 2022. The investigation started in August and ended in November 2022.

3.1 Eligibility Criteria

Regarding the population, the study includes older adult patients requiring long-term care. The review will include studies that describe the indicators of quality of care for older adults who have experienced different situations and realities and residing in different geographical areas.

3.2 Primary Result

The main objective will be to identify the quality indicators described in the scientific literature that refer to long-term care.

All randomised trials published in the timeline established above that identify quality indicators of long-term care models promoting empowerment for self-care will be included.

As for the sources of data regarding the research strategy, the aim is to conduct a broad bibliographic search. Thus, the following databases were searched: CINAHL Plus with Full Text, MediciLatina, MEDLINE with Full Text, and Psychology and Behavioral Sciences Collection.

3.3 Search Terms

The research included the combination of three key concepts according to the following Medical Subject Headings (MeSH) terms:

(“Long-term”) OR (“Home”) OR (“Residential care”) AND (“Person-centred care”) OR (“Patient-centred care”) OR (“Client-centred care”) AND (“Models of care”) OR (“Models of care”) OR (“Models”)

The strategy was customised for each database and restricted to January 2017 and August 2022, looking for articles in English, Portuguese, and/or Spanish.

Articles selected from the different databases, and those found to be repeated, were excluded.

To minimise bias, two reviewers will independently assess the inclusion of articles by reading the title, abstracts and keywords, excluding those that do not meet the inclusion criteria for this review. The third reviewer will be consulted in case of disagreements or uncertainties. Following this, the full texts of the articles will be read and assessed. A PRISMA flow chart will be presented with the results of the review through the different stages of the process [24].

Initially, during the data extraction phase, a descriptive assessment of each study will be performed using an extraction tool designed to extract information according to the research in question (quality indicators; long-term care models that promote self-care training). Other information extracted will be: authors, year of study, study title, purpose of study, samples, results, methods, and conclusions.

Data extraction will be performed by the same two reviewers independently, and any uncertainty or disagreement will be resolved by consulting the third reviewer.

Again, this step was performed by the same two reviewers independently. Any disagreement with the quality assessment of the studies will again be resolved with the intervention of the third reviewer.

3.4 Data Synthesis Strategy

The synthesis and analysis of the findings will be narrative in nature and structured to answer the research questions posed.

A data summary table will be constructed to synthesise the answers to the research questions. These data will be grouped in a table with the characteristics of the included studies. The author, year, sample, gender, objectives, methods, interventions, outcomes, conclusions, country, and relevant comments will be noted, and a data compilation scheme constructed.

This representation will allow grouping and synthesizing the available data of each study and will facilitate the analysis and discussion of the results. Tables, graphs and/or figures will be prepared to present the results of the synthesized data. They will be arranged in the same way as the syntheses are reported in the narrative text to facilitate comparison of the results of each study included in the review.

All team members will participate in this process to improve the presentation of data. Regarding patient and public involvement, there is no involvement of these elements in the design and development of the review.

3.5 Quality Assessment

As this is a review of quantitative studies, the quality assessment tool will be the Joanna Briggs Institute to help assess the reliability, relevance and outcomes of the published articles.

Again, this step will have the independent intervention of the same two reviewers. Any disagreement with the quality assessment of the studies will be resolved with the intervention of the third reviewer. The result of the quality assessment of each study will be presented. These data are inclusion/exclusion criteria, so all selected studies will be duly analysed. In this way, it will be possible to understand the quality of the evidence produced in the context of this assessment.

3.6 Patient and Public Engagement

There will be no patient or public participation in this study.

3.7 Conclusion

The scope of this systematic review is intended to identify indicators of quality of long-term care, within long-term care, regardless of setting and in older adults. It will provide an overview of different models of care and their relationship to quality of life in the populations studied. We will use a transparent and rigorous procedure to identify and review all relevant published and unpublished randomised controlled trials.

Registration of Systematic Reviews: The study protocol was registered with the International Prospective Register of Systematic Reviews (PROSPERO; registration number: CRD4202234867).

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Monitoring and Management of Chronic and Non-chronic Diseases



Towards a Classical-Quantum Platform for Pharmacogenetic Simulations

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Abstract. To determine if the prescription of a particular drug will cause adverse effects to a polymedicated aged person, it is necessary to define the different variables considered and to model the relationship between them. These variables are complex and their relationships depend on multiple factors such as genetics or the patient's medical history. Currently, classical computers require very high computing times to process all this information. With the quantum computing approach, it is possible to solve these problems in a fundamentally new and faster way. In this work, a software system is proposed that combines both approaches, a classical part that allows healthcare professionals a graph-based visualization so that they can understand and edit the stored variables and their relationships with a pharmacogenomic design, and a quantum part which is responsible for predicting how a certain drug will act given specific characteristics of the patient. With the use of this application, healthcare experts will be able to prescribe in a personalized way and achieve an optimization of the pharmacological treatment of patients.

Keywords: Quantum computing · Hybrid applications · Aging · Pharmacological treatment

1 Introduction and Motivation

Pharmacological treatment is necessary to treat most diseases, to maintain health or to prevent further deterioration. Currently, 80 percent of adults over age 65 have at least one chronic disease, while 68 percent have two or more [1]. For these reasons, drug treatment in the aged is a critical aspect in which health experts have to take special care. However, an inadequate prescription is an important and constant problem in this target group of people [2].

Pharmacogenetics, considered as the science that studies the response to drugs, is used to optimize treatment at the individual level, where both the genetics of individuals and the variables of their health trajectory throughout

their lives are involved [3]. The main problem lies in the fact that this kind of pharmacogenetic studies are being performed on classical computers, which involves a large computational cost that grows exponentially as more data are involved in the pharmacogenetic model [4].

All this leads us to consider new alternatives such as quantum computing. This technology has generated a new computing paradigm where all these operations—of extracting information from the variables—can be performed in a time considerably reduced with respect to classical computing [5] [6]. Actually, there are several studies that show the improvements that quantum computing will bring to the healthcare sector [7], where it can enable important advances such as drug development, rapid DNA sequencing or the processing of big healthcare data [8].

However, for pharmacogenetic and health experts, quantum computing is a field that is beyond their competence. Therefore, what is proposed in this work is to provide health professionals with a graphical tool that serves as technological support for the visualization and preparation of data, and to be able to perform a quantum simulation. The aim of this is to predict the possible adverse effects that a drug may have on an aging person and, therefore, to reduce erroneous prescriptions.

2 Classical-Quantum Platform for Pharmacogenetic Simulations

2.1 General Architecture of the Platform

This section presents the proposed solution, for which the following architecture is proposed as technical support and as a graph-based tool to help pharmacogenetics experts in the preparation of the datasets, the extraction of the relationships between the different variables and facilitate the visualisation of this information in a useful way for health experts when prescribing medicines.

This architecture is based on a hybrid classical-quantum system which, as shown in Fig. 1, is divided into two main layers (front-end and back-end) made up of several modules. The technical aspects of this architecture are detailed in Javier Romero-Alvarez et al. [9].

The main features of the architecture are the development of the web module. It will act as the front-end of the system and has been developed with the NodeJs¹ environment and the Cytoscape JavaScript library². Its function is to provide the user with a graphical interface with which to manipulate the graph with the pharmacogenomic variables of a patient, add new variables, and invoke the quantum simulation with the represented data.

Additionally, the back-end is made up of a series of services in charge of carrying out the operations/connections with the database, both reading, writing, modifying or deleting, and offering the web services to be consulted by the

¹ <https://nodejs.org/en/>.

² <https://js.cytoscape.org/>.

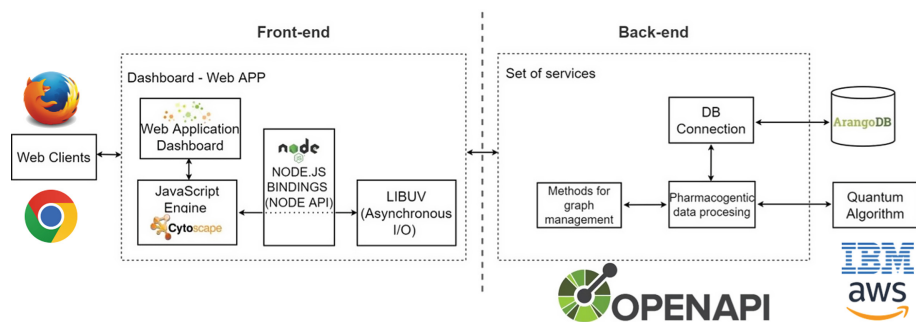


Fig. 1. Architecture of the Classical-Quantum platform

web application. In addition, they are responsible for all data processing and for performing the transformation of the data for connection with the quantum algorithm.

In order to define these back-end services and encapsulate the code of the quantum circuit in charge of the simulation, the OpenAPI³ specification and its code generator⁴ have been modified. OpenAPI is one of the most widely used standards for API description and, to this end, defines a vendor-independent description format for REST-enabled services [10]. The acceptance of the REST architectural style as a method and protocol for manipulating and exchanging data between different systems has greatly changed the development of web services. Today, RESTful web services have become a standard for the development of web APIs [11].

However, as APIs proliferate, the need for both humans and computers to discover and understand the capabilities of services without access to source code or documentation has become apparent. The OpenAPI specification is one of the most widely used alternatives for developers to define, document and implement APIs in a standardised way. This standard facilitates the design of APIs using different support tools (Swagger Editor, Open API Explorer, etc.), providing a well-defined structure that complies with the standard and considerably reduces API implementation time.

Specifically, an extension of the OpenAPI specification and its code generator is proposed to allow developers to define quantum services, bind them to a quantum algorithm and automatically generate the source code of the service ready to be deployed and simulation can be carried out.

Finally, the study and design of this algorithm will make it possible to predict how a given drug will act given specific patient characteristics. Its connection with the system is carried out with hybrid classical-quantum methods, such as

³ <https://www.openapis.org/>.

⁴ <https://openapi-generator.tech/>.

those offered by some of the main quantum service providers, such as Amazon Braket⁵ and IBM Quantum⁶, among others.

2.2 Health Consultation Prediction Model and Web Interface

Once the architecture was defined, the variables and their relationships were known, and the incidences of all the patients, a prediction model was defined based on Machine Learning techniques to help healthcare experts in carrying out queries on patient graphs on the platform itself. In this way, the main technologies and algorithms in the field of Machine Learning have been analysed in order to select the most suitable ones. Subsequently, the prediction model has been designed to be able to deduce a correspondence that allows the labelling of the actions and queries to be carried out by healthcare professionals. In other words, the prediction system will try to detect and recommend to the healthcare professionals the next actions they can carry out based on the history of actions carried out and the data of the patient to be consulted.

Therefore, to carry out the process of prediction development and model generation, a dataset will be available that includes adverse effects, medication error reports and product quality complaints that resulted in adverse effects, as well as information on the patients taking these medicines. In addition, the action history of queries made by healthcare professionals on patients' networks will be available. The aim is to be able to deduce a relationship that allows labelling possible queries on the networks, in order to help the healthcare professionals in carrying out these queries.

Once we have a history of the actions of the healthcare workers, we can select the prediction technology that best suits them and, within this, the algorithm that performs best in terms of performance, accuracy, etc. As the output obtained is a set of probabilities that are assigned to the possible queries that can be made, the algorithm to be used will be a classification algorithm. In this type of approach, the output is a categorical result or discrete value, which can be assigned or classified into specific classes.

For predictions, those actions with the best prediction would be returned or, according to the results obtained after validation, the query actions with a prediction greater than 0.75 in the case of Machine Learning algorithms. In this way, when healthcare staff view a patient's history, the prediction model will recommend a query node based on those that have been added to other patients previously. An example of this recommendation with the node marked in green can be seen in Fig. 2. If the clinician decides to select the node recommended by the prediction system to finish the simulation, the system will save the data related to this case—with respect to the patient's privacy—to feed back into the prediction model and continuously improve it.

The system interface has a main window that displays the graph of the stored data, and a series of buttons and drop-downs to locate the patients, select the nodes of the graph, and call the quantum simulation.

⁵ <https://aws.amazon.com/braket/>.

⁶ <https://quantum-computing.ibm.com/>.

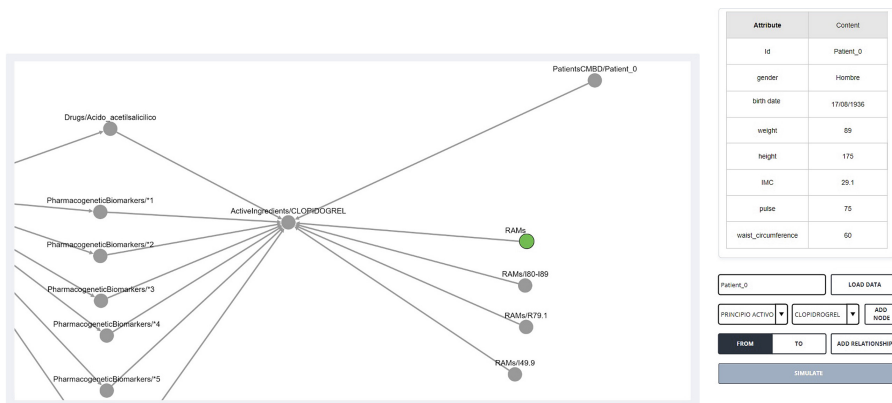


Fig. 2. Platform web interface with graphical representation of patient information

Finally, to visualise the temporal evolution of the patient's history, there is the option of selecting, by means of a drop-down menu, the different time records, or browsing by means of the buttons. In this way, different graphs will be generated depending on the selected temporal record. To do this, a filter will be applied to the *timestamp* associated with each entry in the patient's history, obtaining the data relating to a specific moment in the database.

3 Conclusion

The classical-quantum hybrid platform proposed in this paper will serve as technological support for pharmacogenomics experts during the preparation of the data sets and the extraction of the relationships between the different variables. Furthermore, it will provide a dashboard that will allow healthcare professionals to perform complex consultations and facilitate the visualization of the information in a useful way. All this, with the aim of determining if the administration of a given drug would have an adverse effect on a polymedicated aged person.

Although the research has achieved all the proposed objectives, there are other opportunities for work in the field of quantum software. Currently, new quantum technologies are emerging, so it will be necessary to test quantum software and facilitate the development of integrated classical/quantum hybrid software dynamically.

Based on what has been demonstrated above, we believe the proposed system will be a significant breakthrough in the healthcare field. It is expected to be efficient, improving the prescription of drugs and, consequently, the quality of life of the aged.


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The Caregiver's Contribution in Managing the Disease of the Coronary Patient: A Systematic Review of Literature

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Abstract. Coronary heart disease is the chronic disease that kills the most in Europe and Portugal, so the importance of individual and family responsibility and involvement in managing the disease process is undeniable. Objectives: To understand how the caregiver contributes to the management of coronary disease, identifying areas of intervention, behaviours and characteristics of the relationship. Methods: Systematic review through a PubMed search of studies published between January 2016 and May 2021, with 99 articles identified and 8 of these selected for discussion. Results: The studies describe the interaction that exists between the coronary patient and their caregiver and how this relationship influences the management of the disease. Conclusions: The caregiver promotes the patient's self-care, as well as adherence to health-promoting behaviours and a healthy lifestyle. The relationship of the dyad is characterized by proximity, support and sharing of responsibilities, highlighting the importance of including the caregiver in health education interventions, as a fundamental element in the process of transition and maintenance of chronic disease.

Keywords: Coronary disease · Self-care · Nursing · Family

1 Introduction

The World Health Organization indicates cardiovascular diseases as the leading cause of death worldwide, affecting more individuals annually than any other disease [1]. In 2016, chronic diseases were responsible for 71% of deaths worldwide, of which 44% were caused by cardiovascular disease [2]. The target set by the World Health Organization points to a relative reduction of 25% in mortality from chronic diseases by 2025. However, given the aging of the population, the forecast is that the number of deaths from coronary disease will increase and reach 22.2 million in 2030 [3]. In the European Union, 60 million individuals suffer from cardiovascular disease, and per year, there are about 13 million new cases; moreover, there is an increasing number of patients surviving an acute myocardial infarction and these have a growing number of

comorbidities, which represents a set of adverse effects for the individual and causes considerable pressure on health systems [4].

In Portugal, the scenario is similar to that described worldwide: cardiovascular diseases also represent the main cause of death among the national population and are an important cause of morbidity, disability and loss of years of quality of life [5]. Although the percentage of deaths from cardiovascular disease is decreasing, with a value of 29.7% in 2015, which is one of the lowest values in the last decade, the mortality rate from ischemic heart disease in individuals aged less than 70 years, has worsened in the last 5 years [5]. This indicator is a reminder of the importance of continuing to invest in this area of health, making it a priority in the various areas of assistance.

Coronary artery disease can be classified as chronic or acute coronary syndrome, according to its clinical presentation; is defined as a set of functional alterations in the circulation of the coronary arteries, caused by a dynamic process of formation of atherosclerotic plaque, which can be altered by adopting healthier lifestyles, pharmacological therapies and with the aid of revascularization, through which a regression or stabilization of the disease takes place [6].

The ambiguity of chronic diseases, combined with their higher prevalence, caused by the aging of the population, is associated with a significant financial and social impact on today's societies, which makes it necessary to implement policies that encourage accountability and the involvement of individuals in the management of the health-disease process. [7, 8]. However, the attention of the health systems is more directed towards the person with an acute illness, to the detriment of self-care intervention areas, which have shown important results for people with a chronic illness; there is evidence that interventions aimed at coronary patients, with a view on changing lifestyles and improving self-care, show better results in terms of therapeutic adherence and quality of life than those that only aim at momentarily accepting a certain activity, such as cardiac rehabilitation [9].

Self-care is considered fundamental for the management of chronic illness. This concept is defined as a health maintenance process, which occurs through the promotion of health behaviours and disease management, being recognized in a health or disease situation [10]. Although self-care is, by definition, related to the individual sphere, it is undeniable that this process does not occur in isolation – most chronically ill people recognize the fundamental role of family and friends, which translates into communication, decision-making and reciprocity [10].

The change that we are witnessing in the evolution of diseases, with an increasing prevalence of chronic disease, also entails challenges in the family context [8]. Coronary heart disease, like any other chronic disease, is characterized by periods of exacerbation and hospital readmissions, which requires permanent management of the disease, profound changes in lifestyle and constant attention by the patient and the caregiver [7]. The risks associated with acute illness or early mortality can be mitigated through adherence and adjustment of essential drug therapy for coronary disease, as well as the ability to immediately recognize signs and symptoms, which entails monitoring by health professionals, that is not only directed to the patient, but also to the family member/caregiver [11]. Although the importance of guidance and assistance from health professionals to achieve an effective management of the health-disease process is irrefutable [8], it

must be considered that, within a year, the patient only spends 10 h or 0.0001% of your time with these [9]. That said, most of the monitoring, management and maintenance behaviours occur outside the hospital or consultation environment and, therefore, adopt the form of self-care activities practiced by the individual and the family, at home [9].

2 Methodology

The present work fulfills the methodological design of a systematic review, through which it seeks to gather and synthesize recent scientific evidence, following a set of criteria, in order to answer a specific initial question [12].

In order to initiate the research process, in accordance with the methodological design of the Joanna Briggs Institute [13] and the PICO model (Population, Intervention, Context and Outcome), the question was defined as: What is the caregiver's contribution in the management coronary disease at home? (Table 1).

Table 1. Review question PICO

Review question PICO	
Population	Coronary patient
Intervention	Caregiver's contribution
Context	Home
Outcome	Management of coronary disease

The systematic literature search was achieved using PubMed scientific databases, using the combination of the Boolean operator AND with the health sciences descriptors Coronary disease, Patient, Nursing and Family.

As inclusion criteria, studies published in the period between January 2016 and May 2021 were considered, with reference to the descriptors in the presented abstract and that explicitly or implicitly addressed the support of the caregiver directed to the coronary patient for the management of the disease. All articles that were not related to the theme addressed were excluded. The survey was carried out in the period between May 15 and 31, 2021.

The selection of articles is represented in the following flowchart (Fig. 1) and constituted a phased and progressive process.

The initial search, with only defined Boolean descriptors and operators as a limitation, selected a total of 307 articles; this number was reduced to 99 after the time window was redefined. At first, only the title and abstract of the articles were read, and those that did not prove to be of value according to the theme explored were immediately excluded, leaving 10 articles. Subsequently, the articles were read in full and, as they did not answer the research question and did not meet the study objectives, 2 articles were excluded.

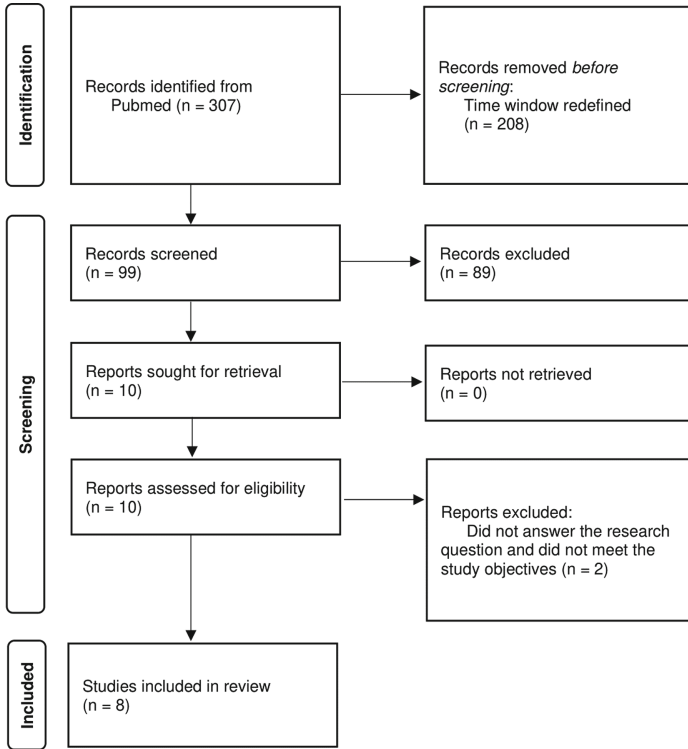


Fig. 1. PRISMA flow diagram [14]

In a final phase, a critical evaluation of the 8 selected articles was carried out, taking into account the classification of the levels of evidence (Table 2) and the instruments for evaluating the methodological quality (Table 3) of the Joanna Briggs Institute [13].

Table 2. Classification according to levels of evidence [13]

References	Levels of evidence
Sebern, Brown, & Brennan-Flatley (2016) [15]	4b – Cross sectional study
Kahkonen, et al. (2020) [16]	3e – Observational study without control group
Huriani (2019) [17]	4b – Cross sectional study
Buigues, et al. (2021) [18]	3c – Observational study – Cohort study with control group
Chen, Lin, & Marshall (2020) [19]	4b – Cross sectional study

(continued)

Table 2. (continued)

References	Levels of evidence
Dumit, Noureddine, & Magilvy (2016) [20]	4b – Cross sectional study
Chiou, Hsu, & Hung (2016) [21]	4b – Cross sectional study
Hajduk, et al. (2016) [22]	4b – Cross sectional study

Table 3. Critical appraisal of methodological quality [23]

Studies	Appraisal of methodological quality											
	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	%
[15]	Yes	Yes	Yes	Yes	N/A	N/A	Yes	Yes	–	–		75%
[16]	Yes	N/A	Yes	N/A	N/A	Yes	Yes	Yes	Yes	N/A	Yes	63%
[17]	Yes	Yes	Yes	Yes	N/A	N/A	Yes	Yes	–	–	–	75%
[18]	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	N/A	Yes	81%
[19]	Yes	Yes	Yes	Yes	N/A	N/A	Yes	Yes	–	–	–	75%
[20]	Yes	Yes	Yes	Yes	N/A	N/A	Yes	Yes	–	–	–	75%
[21]	Yes	Yes	Yes	Yes	N/A	N/A	Yes	Yes	–	–	–	75%
[22]	Yes	Yes	Yes	Yes	N/A	N/A	Yes	Yes	–	–	–	75%

According to the levels of scientific evidence, there was some homogeneity, as most articles were evaluated as cross-sectional studies. In the methodological evaluation, it was decided to keep all the analysed articles, even though there is a study with a final evaluation of 63%, it was included as it proves to be an added value for the theme and supports the starting question.

3 Results

After the validation process of the articles, it was decided to include the 8 studies in this systematic review, having then proceed with extraction and analysis of results; the following table (Table 4) shows their summarized interpretation.

Table 4. Results and summarized interpretation

Identification of authors Date	Objective of the study	Participants	Results	Conclusion
<i>Shared care contributions to self-care and quality of life in chronic cardiac patients</i> Margaret Sebern Roger Brown Patricia Brennan-Flatley 2016 [15]	Evaluate the contribution of shared care between the caregiver and the individual with heart disease, with regard to self-care and the quality of the latter's mental health Evaluate the dyad relationship (caregiver and patient) from the perspective of communication, decision-making and reciprocity, focusing on the results for the patient	186 individuals: 93 cardiac patients and their caregiver	The caregiver's communication and reciprocity (characterized by empathy and companionship) is associated with benefits for the patient's mental health The communication and reciprocity of cardiac patients has positive effects on self-care and on the quality of their mental health	This study highlights the importance of evaluating the relationship of reciprocity and communication between the cardiac patient and their caregivers, with the aiming to intervene in the most difficult and lacking areas

(continued)

Table 4. (continued)

Identification of authors Date	Objective of the study	Participants	Results	Conclusion
<p><i>Support from next of kin and nurses are significant predictors of long-term adherence to treatment in post-PCI patients</i></p> <p>Outi Kahkonen Helvi Kyngas Terhi Saaranen Paivi Kankkunen Heikki Miettinen Anee Oikarinen 2020 [16]</p>	<p>To identify the level of adherence to treatment and its predictive factors in individuals with coronary disease, six years after percutaneous coronary intervention</p> <p>Produce knowledge about adherence to long-term treatment</p>	<p>169 hospitalised patients in five Finnish hospitals, post-percutaneous coronary intervention. A questionnaire was applied 4 months and then 6 years after the procedure</p>	<p>There was greater adherence to a healthy lifestyle six years after the percutaneous coronary intervention than in the 4 months after the procedure, which translates into less alcohol and tobacco consumption or physical exercise</p> <p>Patients who benefit from the support of a caregiver are more aware of self-care and are also more physically active</p> <p>The support of doctors and nurses is perceived as reduced by female patients, which translates into feelings of long-term fear</p> <p>In the long-term, support from health professionals is recognized as na importante predictor of adherence</p>	<p>In a long-term perspective, the caregiver's support, the support of health professionals, the fear of complications, the patient's own responsibility and the results of care are factors that influence adherence to treatment</p> <p>It emphasizes the importance of directing attention to risk groups, such as female patients, without reference to a caregiver, physically inactive or with prolonged coronary disease</p>

(continued)

Table 4. (continued)

Identification of authors Date	Objective of the study	Participants	Results	Conclusion
<p><i>Myocardial infarction patients' learning needs: Perceptions of patients, family members and nurses</i> Emil Huriani 2019 [17]</p>	<p>Identify and compare the perceptions of post-acute myocardial infarction patients, their families and nurses who care for people with heart disease regarding the patient's educational needs in the acute, subacute and post-acute moments To determine standards and criteria in health education for patients who have suffered an acute myocardial infarction</p>	<p>288 post-acute myocardial infarction patients hospitalized in an acute cardiovascular care unit, cardiology ward or on an outpatient basis 145 relatives of these patients 40 nurses working in these services</p>	<p>The need for education in post-acute myocardial infarction patients is high, according to the participants' perception The teaching areas accepted as priorities are different between the study groups, with priority given to the area of medication (patients) and symptom management (families) Family involvement in the health education process provides the creation of a help system for the patient's recovery</p>	<p>Given the different perceptions of training needs of patients who have suffered an acute myocardial infarction, a rigorous assessment of the needs of the patient and family is essential The study demonstrates that it is fundamental to build an educational system centred on the patient and family, considering the learning needs, individualized information and priorities of each group</p>

(continued)

Table 4. (continued)

Identification of authors Date	Objective of the study	Participants	Results	Conclusion
<p><i>Psycho-Social Factors in Patients with Cardiovascular Disease Attending a Family-Centred Prevention and Rehabilitation Programme: EUROACTION Model in Spain</i> Cristina Buignes Ana Queralt Jose Antonio De Velasco Antonio Salvador-Sanz Catriona Jennings David Wood Isabel Trapero 2021 [18]</p>	<p>To understand the effect that a family-centered cardiovascular prevention and rehabilitation program has on changing perceptions of illness to achieve better outcomes</p>	<p>Patients hospitalized for acute heart disease or followed on an outpatient basis and their caregivers Participants in the intervention group were invited to participate in a cardiovascular prevention and rehabilitation program for 8 weeks. The control group received the support that is usually given. Questionnaires and medical examinations were performed on both groups at baseline, 16 weeks and 1 year after the end of the program</p>	<p>Patients included in the program had a better perception of the disease, decreased levels of anxiety/depression and cardiovascular risks, thus improving their quality of life Higher levels of stress and anxiety were directly related to a more threatening perception of the disease More controlled stress and anxiety levels were related to better eating habits, cholesterol and blood pressure analytical values</p>	<p>Cardiovascular prevention and rehabilitation programs similar to the one used represent a good option to control feelings of anxiety, recognizing possible needs of a psychological and educational nature, with the aim of improving the perception of the disease and producing better habits Caregivers help in the acquisition of better life habits, motivate and support the patient, perpetuating these behaviors in time</p>

(continued)

Table 4. (continued)

Identification of authors Date	Objective of the study	Participants	Results	Conclusion
<p><i>Patient and family perceptions and experiences of same-day discharge following percutaneous coronary intervention and those kept overnight</i> Yingya Chen Frances Fengzhi Lin Andrea P. Marshall 2020 [19]</p>	<p>Explore the perceptions and experiences of patients undergoing percutaneous coronary intervention and their families, with clinical discharge on the same day or the next day</p>	<p>31 patients submitted to planned percutaneous coronary intervention, discharged on the same day (n = 17) or the next day, due to femoral access (n = 14) 23 relatives of patients submitted to the procedure</p>	<p>Family members report that there were failures in communication and teaching related to discharge and directed to the caregiver Acquisition of knowledge immediately after the procedure represents a challenge for patients and that they feel vulnerable after discharge Although most participants describe the early post-procedure discharge as a positive experience, there is also reference to feelings of anxiety and false perception of the severity of the disease</p>	<p>Participants describe early discharge as a positive experience, if there is a strategy that supports not only the patient, but also the caregiver, in the process of transition from hospital to home, building a relationship of trust in the management of the chronic disease</p>

(continued)

Table 4. (continued)

Identification of authors Date	Objective of the study	Participants	Results	Conclusion
<p><i>Perspectives on barriers and facilitators to self-care in Lebanese cardiac patients: a qualitative descriptive study</i> Nuhad Yazbik Dumit Samar Nayef Nouredine Joan Kathy Magilvy 2016 [20]</p>	<p>To explore the practice of self-care by people with coronary disease in the Lebanese population Identify factors that influence the practice of self-care in the type of patient under study</p>	<p>15 adults (8 male e 7 female) diagnosed with coronary heart disease at least 1 year ago and without current critical condition</p>	<p>Behaviours that demonstrate the practice of self-care are reflected in adherence to medication, healthy eating and smoking cessation; some participants also mentioned rest and avoidance of worries Family responsibility, costs associated with health and psychosocial factors represent the greatest obstacles to the practice of self-care for Lebanese heart patients Family support is the main facilitating factor in the practice of self-care</p>	<p>Nurses should value self-care in people with coronary disease, assessing the context of each patient and providing them with information that allows them to better understand and, therefore, better manage the disease The role of the family member in supporting the self-care of the coronary patient should be identified, including and exploring the caregiver element in the care plan</p>

(continued)

Table 4. (continued)

Identification of authors Date	Objective of the study	Participants	Results	Conclusion
<p><i>Predictors of health-promoting behaviors in Taiwanese patients with coronary artery disease</i> Ai-Fu Chiou Shu-Pen Hsu Huei-Fong Hung, 2016 [21]</p>	<p>To describe health-promoting behaviours and their predictive factors in coronary patients Understand the relationship between health-promoting behaviours and quality of life</p>	<p>200 participants with coronary heart disease of two cardiovascular units in the same hospital</p>	<p>The study population demonstrated a moderate level of health-promoting behaviours, with physical activity being the least mentioned domain The factors that influence this type of behaviour include age, obesity, smoking, perception of the health condition, perception of benefit or severity, perception of health control, self-care and support from the family/caregiver, highlighting the importance of the last three Health-promoting behaviours have a significant correlation with quality of life</p>	<p>Health-promoting behaviors are affected by several multidimensional factors Nurses must individually assess lifestyles, cognitive factors and influencing factors, as well as the family support network of each patient, offering them a more targeted education and encouraging behaviours that lead to a better quality of life</p>

(continued)

Table 4. (continued)

Identification of authors Date	Objective of the study	Participants	Results	Conclusion
<p><i>Practical care support during the early recovery period after acute coronary syndrome</i> Alexandra M. Hajduk Jacquelyn E. Hyde Molly E. Waring Darleen M. Lessard David D. McManus Elizabeth B. Fauth Stephennie C. Lemon Jane S. Saczynski 2016 [22]</p>	<p>To describe the prevalence and predictive factors of receiving practical support for acute coronary patients in the post-early discharge period</p>	<p>406 participants diagnosed with acute coronary disease answered a questionnaire within the first 72h after hospital admission and one week (5 to 10 days) after discharge to their homes</p>	<p>2/3 of the participants reported that they needed support in the week after discharge and 8 out of 10 received practical support (informative or instrumental in nature) from the caregiver during this period Acute coronary patients are unable to recover from the cardiac event and to initiate adequate management of behaviours independently Male patients describe receiving less support. Married patients, patients with higher level of education and patients who suffered complications during hospitalisation describe receiving more practical support than the rest</p>	<p>Patients with different characteristics describe receiving different types of post-discharge practical support An assessment should be undertaken to understand post-discharge support needs The caregiver represents an important resource to assist in the management of the disease, which translates into better outcomes for the person with coronary syndrome</p>

4 Discussion

The studies analysed in this review, either explicitly or implicitly, confirmed that the family member and/or caregiver has an intervening role in the management of the disease of the person with coronary disease. The family emerges as the essential resource in supporting the coronary patient [16, 17, 19–22].

Family support, which presupposes a close affective relationship and the perception of the other, is presented as a preponderant factor in the adoption of health-promoting behaviours and a healthy lifestyle [16, 21]. Riegel, et al. [9] add that the lack of support from the caregiver, who is usually a member of the family, represents a barrier to the exercise of self-care and that, on the contrary, its positive influence facilitates behaviours such as adherence to the pharmacological regimen, healthy eating and active surveillance. The study by Kahkonen, et al. [16] demonstrates that normal values of total cholesterol, controlled blood pressure and physically more active coronary patients are strongly associated with the support provided by the family. Buigues, et al. [18] corroborates this idea by referring that patients and family members who share the same home, adopt similar changes and lifestyles; it was described that not only patients changed their lifestyle habits, but also caregivers adopted these new behaviours, such as opting for a healthier diet. It appears that patient and caregiver build habits together, support and motivate each other, which results in the perpetuation of these practices and the strengthening of the reciprocal relationship [15, 18]. Testimonies of individuals dealing with chronic illness describe that self-care management is not only an individual growth, but also smooth, complex and that involves the environment in which the patient is inserted, including the family, thus making it a interactive process [7].

The family contributes to the self-care of the coronary patient, since a network of emotional and practical support and assistance in the management of the disease is created [20]. The dyad caregiver and coronary patient is thus characterized by a relationship of sharing responsibility, where communication, companionship and empathy translate into an improvement in the quality of the patient's mental health and gives more confidence in the latter's self-care practice [15]. This relationship is also characterized by the sharing of emotions and behaviours, that is, the family member who provides support and the patient have similarities in their general mood and mental health, with very close levels of anxiety [18], as had been described by Thomson, et al. [24].

The type of caregiver also influences the lifestyle practiced: the support provided by the family is a strong predictor in the acquisition of better health management behaviours, compared to the support offered by informal caregivers or health care providers [21]. This helping relationship is more prevalent in individuals who are married or in a close personal relationship [16, 20, 22]. The fundamental role of the wife in the self-care of the coronary patient stands out, in the form of multifaceted and essential aid to the management of the disease and care [20]. Patients who suffered in-hospital complications, with higher levels of literacy, describe needing some kind of support from their caregiver [22].

Faced with the recognition of the added value that is family support for the coronary patient, the training and education of caregivers emerge as a need to which it becomes preponderant to respond [15–22].

The inclusion of the family of the coronary patient in the health education process allows the creation of a strong support system [17], recognizing the fundamental intervention of the caregiver and the importance of involving them in the care, especially in the preparation for discharge [19, 21, 22]. The caregiver's positive attitude can provide a facilitating contribution to recovery and adherence to the therapeutic regimen after a cardiac event, which is why the scientific community defends the importance of studying and evaluating the behaviour and influence of this relationship [24].

Most individuals with coronary disease, in the immediate post-discharge period, lack support from the caregiver, the latter playing a crucial role in this adaptation process [19, 22]. Patients who are recovering from a recent cardiac event are not able to put into practice disease management behaviours [22], since they are still overwhelmed by hospitalization and the procedures to which they were submitted [19]. The high volume of new information to retain and the deficit that the patient experiences in acquiring knowledge at that specific moment, obliges the family to assume part of this function, which is why they are seen as a fundamental element from the beginning and in a transition period, when changes in lifestyle are needed [16]. Thus, it is the duty of health professionals to educate not only the patient, but also the caregivers/relatives in the process of transition from the hospital environment to home, providing them with tools that allow them to face a new reality, which will include adherence to a therapeutic regimen and to different lifestyles [19]. The family should be considered as an integral part of the care unit, in order to guarantee the safety of the patient, the continuity of the therapeutic regime and the promotion of self-care [16, 19, 21]. The study by Cherlin, et al. [11] suggests that certain interventions may have an impact on the survival rate in the immediate post-discharge of patients with acute myocardial infarction, such as meeting the family's educational needs, recognizing their weaknesses, so that this unit can provide the necessary quality care or assist in its management.

Hajduk, et al. [22] admit the informal caregiver (family member or friend) as an opportune, dedicated and effective resource, which enhances the correct management of the disease, decentralizes the responsibility of the patient (sharing the burden that can be the coronary disease) and improves the long-term outcomes. Thus, the development of strategies that include the family/caregiver in the care provided to the patient, allows consolidating confidence in the management of the disease over time for both [19]. It must be considered that the caregiver's perception of coronary disease will influence and guide the patient's behaviour and interest, which makes it clear the need to focus care on the family as well [18]. As demonstrated by Thomson, et al. [24], the caregiver has more concerns about the disease than the patient and, therefore, a more negative perception of it. The mission of health professionals should include assessing the needs of the dyad and discussing the management of the disease with caregivers and the patient, with the aim of identifying weaknesses and adapting the care regime, filling the needs of each reality [15, 22].

5 Conclusion

It is imperative to assume that the caregiver plays a fundamental role in supporting the coronary patient throughout the process, that constitutes the management of the disease,

in the different aspects that integrate it: health-promoting behaviours, healthy lifestyle and the self-care itself. The relationship that is built is described as close, interactive, characterized by mutual support and responsibility sharing; the patient no longer carries the burden of the chronic disease alone and relies on their caregiver to accompany and assist in this experience. The patient-caregiver dyad tends to establish a relationship that reflects each other, as it is described that they share similar life habits and have a similar mental health condition. It should be emphasized the importance given to the caregiver who is also a member of the family, as is for example the wife, since they establish more effective help relationships from the health outcomes point of view.

All the bibliography analyzed points to the importance of including the caregiver in self-care education interventions, making them a qualified asset in the transition and maintenance process, which occurs after the diagnosis of a chronic illness.

One of the limitations of this work is related to the fact that some analysed articles have as study population a group of individuals who belong to different cultural backgrounds, which can bias comparisons between behaviours. However, from a different point of view, it is believed that it is legitimate to admit that this can also be a strong point of this study, when concluding that among the multiculturalism of populations there is always a common denominator: the recognition of the caregiver's contribution to the coronary patient. Another identified limitation is related to the fact that the research was not directed towards the less positive aspects of the caregiver's role; it should be considered that the concept of contribution was given the connotation of positive collaboration or support.

Finally, it is important to emphasize that this study confirmed the importance of including the family in health care, also observing it as part of the patient's unit. Caregivers, especially those who are also family members, are a valuable resource for preventing recurrence of the acute illness, hospital readmissions and complications, and should be considered as allies of health services, since they will certainly be less expensive and very effective. As an implication for nursing practice, there is a growing need to value the patient-caregiver unit, providing them with tools that allow them to manage, maintain and monitor the disease, understanding the weaknesses of this dyad and satisfying their needs.

It was possible to conclude, throughout all the literature research which resulted in the present work, that the data on the subject are limited. As far as it was possible to ascertain, there are few studies that are dedicated to the impact and outcomes that result from the intervention of the caregiver in the coronary patient, compared to other cardiac diseases, such as heart failure. Additional research is needed to study these assumptions in the Portuguese population, and this article is presented as the starting point for building more scientific evidence on the subject.

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Impact of a Rehabilitation Nursing Program Implemented in the Pre and Postoperative Periods in People Undergoing Elective Abdominal Surgery

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Abstract. Objective: To assess the impact of a Rehabilitation Nursing program on anxiety control and increase of functional independence, when implemented in the pre and postoperative periods in people undergoing elective abdominal surgery. **Methodology:** A cross-sectional descriptive study, based on Robert Yin's Case Study methodology, was applied to patients admitted to a Surgery service of an institution in the south of Portugal, in a non-probabilistic, accidental sample composed of 5 patients. Assessment instruments were used: Modified Borg Scale, Zung's Self-Assessment Scale of Anxiety and Functional Independence Measurement Scale. **Results:** The application of a rehabilitation nursing program based on respiratory, and motor functional re-education interventions effectively contributed to the improvement of respiratory function, anxiety control, pain control, and empowerment for self-care. **Conclusion:** The results of this study indicate that the implementation of the rehabilitation nursing programme in the pre- and postoperative periods for people undergoing elective abdominal surgery contributed to the improvement of functionality in general, the prevention of postoperative complications, the reduction of hospital admissions and the early return of people to their daily and working lives.

Keywords: Nursing · Rehabilitation nursing · Abdominal surgery · Preoperative · Postoperative · Functional independence · Anxiety

1 Introduction

The increase in average life expectancy is a reality worldwide, and in Portugal in particular, a perceptible process of demographic and epidemiological transition is denoted [1, 2].

The aging of the population and the increase in the average life expectancy are combined with an increasingly more frequent prevalence of chronic and acute diseases that lead to the frequent onset of disabilities [3]. The installed deficits of functionality result in the loss of capacity for self-care satisfaction, influencing the psycho-socio-cultural dimensions of the person, as well as his/her active role in society. As a response to this reality, advances in technology and medicine are denoted, particularly at the surgical level, allowing a large part of the disabilities resulting from diseases worldwide is solved by resorting to surgical procedures [4]. Therefore, the demand for surgical care has been increasing, which has required the need for a timely response from health services [5].

Although the aim of the decision to undergo a surgical procedure is to solve a previously existing problem with a view to improving the patient's quality of life, the complications that may arise from a surgical procedure are considered to be one of the main causes of death and disability worldwide, and a problem with significant implications for public health [4].

Among the most common post-surgical complications, pulmonary, cardiac, and surgical wound complications stand out with the highest percentage and greatest impact on surgical morbidity and mortality rates, as well as an increase in the average time and costs associated with hospitalization [6, 7].

As regards postoperative respiratory complications, these are frequent in all types of surgical interventions, however, their incidence is higher in thoracic and abdominal surgeries, and in the case of abdominal surgeries where the incision is above the abdominal scar, the probability of developing relevant pulmonary complications increases in a percentage of 5% to 30% [6, 8]. The manipulation of the abdominal cavity during surgery leads to a decrease in lung volumes and capacities, which triggers changes in the characteristics of breathing, making it shallow and fast associated with a paradoxical abdominal movement, which can cause pulmonary complications due to ventilation-perfusion alteration, with consequent hypoxemia and atelectasis [9]. The diaphragmatic dysfunction that occurs due to the manipulation of abdominal viscera and triggers the reflex inhibition of the phrenic nerve and consequent paresis of the diaphragm, explains these events [9].

The association between surgical trauma and the anesthetic procedure, in addition to causing significant changes in respiratory mechanics and oxygenation, triggers a change in the entire lung function, including the inefficiency of defense mechanisms such as cough and depression of the immune system. These authors also refer to the type of surgical incision performed in abdominal surgery that leads to the rupture of fibers of the respiratory muscles and that, in association with the painful condition often experienced by the person, may be at the origin of the decrease in respiratory activity, generating hypoventilation [8].

It is important to mention that, among the postoperative pulmonary complications, the most frequent are atelectasis, pneumonia, respiratory failure, bronchospasm, pleural effusion, pulmonary thromboembolism, hypoxemia, as well as the exacerbation of pre-existing lung diseases [6, 7].

In addition to post-surgical pulmonary complications, immobility for long periods resulting from the necessary bed restriction in the postoperative period, the presence of

surgical wounds, and eventually drains, are factors that also contribute to respiratory and motor dysfunctions. The postoperative person increases three times the probability of developing pulmonary complications for each day of immobility in bed [8].

Another important factor for postoperative recovery is pain, which is caused by tissue damage produced during surgical procedures, especially in abdominal surgeries. The pain caused by the surgical incision, which in abdominal surgeries is close to the diaphragm, potentiates alterations in respiratory mechanics by the presence of pain during breathing, which will limit the diaphragmatic excursion [8]. Pain is thus a postoperative complication that negatively influences postoperative recovery in abdominal surgeries, and its control in this period is imperative.

Associated with the surgical process and, because it represents a moment of crisis for the individual, stress and anxiety arise, both due to the uncertainties associated with the procedure and the separation from family and environment, as well as the loss of freedom and depersonalization, the fear of dying or becoming dependent on others [10].

Given the above and being aware of the impact that a surgical intervention has on the various dimensions of the human being, there is a need to identify and understand how the differentiated intervention of the specialist nurse in rehabilitation nursing (RESN) can influence and benefit the post-surgical and global recovery of the person. The RESN, equipped with specific skills, develops a differentiated intervention in terms of maximizing the person's functionality and autonomy, through their empowerment.

Therefore, in order to meet the identified need, a study was conducted based on the development and implementation of a nursing rehabilitation intervention program in the pre and postoperative periods for patients undergoing elective abdominal surgery.

2 Methodology

This is a cross-sectional descriptive study, based on Robert Yin's Case Study Methodology (2018) [12]. This work methodology is suitable for this study, since it focuses on each case's response to the complexity of each surgical process, in their unique contexts as individual beings, as well as on the gains obtained from a differentiated intervention based on a rehabilitation nursing program. Thus, and taking into account Yin's line of thought (2018), we aimed to obtain knowledge from the data collected in each case, in order to understand the phenomenon under study as a whole [12].

It was conducted during the period between January and April 2021, involving people admitted to a Surgery service of a health institution in the south of the country for elective surgery.

The eligibility criteria defined for sample selection were: people admitted for elective abdominal surgery, at least 24 h before surgery, who were cognitively able to adhere to the rehabilitation nursing program. The exclusion criteria were emergency surgery or any other type of non-abdominal surgery and people with cognitive changes. Based on the previously defined eligibility criteria and the period defined for the implementation of the intervention project, we selected a non-probabilistic, accidental sample composed of 5 people with this problem.

Data collection methods and techniques included interviews, observation and data collection tools, namely the Zung Anxiety Self-Assessment Scale, the Modified Borg Scale [13], and the Functional Independence Measurement Scale (FIM).

A rehabilitation nursing intervention plan based on respiratory, and motor functional re-education techniques was developed and applied continuously, in daily sessions of approximately 60 min, during the hospitalization of each participant in the study.

Three distinct moments of assessment and data collection were established: 1st day of hospitalization (preoperative), 1st postoperative day, and 3rd postoperative day/day of discharge. It should be noted that the implemented program was subject to changes whenever necessary, with constant re-evaluations and redefinition of strategies in order to better adapt it to the individual needs of each person, and post-surgical specificities.

The rehabilitation nursing intervention program developed was based on the analysis of the literature based on the available scientific evidence and included: a session to clarify doubts and provide information about the surgery to be performed; instruction and training of rest and relaxation techniques; instruction and training of specific functional respiratory re-education techniques (abdominal-diaphragmatic breathing, selective costal re-education with upper limb abduction in dorsal and lateral decubitus, global back re-education with baton, diaphragmatic re-education with flexion/extension of the hip-femoral joint, controlled inspiratory flow/fractional inspiration exercise, directed coughing, and, airway clearance techniques if needed), instruction and encouragement of the use of non-pharmacological techniques for pain control; active and active-resisted mobilizations in bed; therapeutic exercises in bed (bridge, bearings); instruction and training of the lifting technique; postural correction technique in orthostatism using a mirror; gait training; training of lower limbs; incentive spirometry (using a volume-dependent spirometer) [7, 11, 13–19].

To conduct this study, certain ethical aspects were taken into account. The opinion of the ethics committee of the institution involved in the study was sought and authorised with Order 031/2021, dated 17/03/2021. All participants were previously informed and clarified about the content, objectives and interventions of the project in which they were proposed to be included, and, in order to ensure their consent to participate in it, confidentiality was ensured regarding the data collected, and the right to withdraw from the project at any time.

3 Results

Of the total 5 participants in the study sample, 3 are male and 2 are female. The age range of the sample is between 57 and 74 years, with a mean age of 63.6 years, and a standard deviation of 6.877 (Table 1).

Table 1. Sociodemographic characterization of the sample.

Participant	A	B	C	D	E
Age	60	57	74	60	67
Sex	Male	Male	Female	Female	Male
Nationality	Portuguese	Portuguese	Portuguese	Portuguese	Brazilian
Marital Status	Married	Married	Widow	Married	Married
Professional Status	Active (warehouse worker)	Active (Cook)	Retired	Unemployed	Active (Bricklayer)
Household	Wife and 2 children	Wife	Neto (19 years old)	Husband	Wife

Regarding the employment status of the participants in the sample, we found that 3 participants are professionally active, and 2 participants are professionally inactive due to retirement or unemployment. The only retired participant (participant C) corresponds to the participant with the maximum age within the age range included in the sample. Concerning the participants' households, it was found that none of the participants lived alone, all of them lived with relatives (Table 1).

Table 2. Characterization of the sample as to the reason for admission, surgical intervention and personal background

Participant	A	B	C	D	E
Diagnosis	HEH/GERD Vesicular Lithiasis	Gastric Neoplasia	HEH/GERD	HEH/GERD	Gastric Neoplasia
Surgical Intervention	Toupet Fundoplication and Cholecystectomy	Gastrectomia sub-total	Nissen Fundoplication	Nissen Fundoplication	Sub-total gastrectomy
Personal History	Cardiac arrhythmia under study; SARS-CoV-2 infection (in January 2021)	–	Osteoporosis; Dyslipidemia; HTA; Asthma; 2 ectopic pregnancies at ages 30 and 35	Hypothyroidism; Osteoporosis; Chronic gastritis; Irritable bowel syndrome; Arthrosis of the DIJ of the hands	HTA; Dyslipidemia

(continued)

Table 2. (continued)

Participant	A	B	C	D	E
Surgical history	SI due to ruptured meniscus at age 18; Right inguinal hernioplasty in 2004; Umbilical herniorrhaphy in 1982	–	Total hysterectomy with bilateral annexectomy in 2012; Laparoscopic cholecystectomy in 2018; Total right knee arthroplasty for gonarthrosis	Laparoscopic cholecystectomy for vesicular lithiasis in 2010; Uterine polypectomy in 2018	Hemicolectomy in 2016
Smoking habits	No (former smoker for 14 years)	Yes (4 cigarettes/day)	No	No	No
Physical exercise habits	No	Yes (walking 6–7 km/day)	No	No	Yes (walking 1h/day)
Medication at home	Yes	No	Yes	Yes	Yes

Key: HEH (Herniated esophageal hiatus) | GERD (Gastroesophageal reflux disease) | HTA (Hypertension) | DIJ (Digital interphalangeal joint) SI (surgical intervention) | km (Kilometer) | h (hour).

From the sample under study, it should be noted that the presence of comorbidities and personal antecedents identified is quite varied, however, we highlight the surgical history, with most participants (4) having had previous hospitalizations resulting from one or more surgical procedures, the presence of previous respiratory pathology in 1 participant (participant C), as well as smoking habits in 1 participant (participant B). Finally, 4 participants take medication at home associated with their personal history (Table 2).

Regarding the type of surgical interventions performed, the Nissen fundoplication was performed in 2 participants, sub-total gastrectomy was performed in 2 participants, Toupet fundoplication was performed in 1 participant, and cholecystectomy was performed in 1 participant. From the results presented, it should be noted that cholecystectomy was associated with Nissen fundoplication surgery (participant A), considering the diagnoses of the participant in question (Table 2).

Regarding respiratory function, it can be observed in all participants a worsening of the same on the 1st postoperative day, observable by the decrease in SPO2 values, changes in ventilatory dynamics (observed in participants B and C), increased production of secretions and presence of ineffective cough, need for oxygen therapy (participant B), increased respiratory rate, and increased scores on the Modified Borg Scale (Table 3).

In order to address the identified changes, preventing the development of postoperative complications, specific functional respiratory re-education techniques were developed in all participants, as recommended by the proposed program, both preoperatively

Table 3. Data resulting from the evaluations carried out, from the selected data collection instruments.

	Modified Borg Scale			FIM			Zung Anxiety Self-Assessment Scale		
	1st Ev (pre-op)	2nd Ev (1st day post-op)	3rd Ev (Discharge)	1st Ev (pre-op)	2nd Ev (1st day post-op)	3rd Ev (Discharge)	1st Ev (pre-op)	2nd Ev (1st day post-op)	3rd Ev (Discharge)
A	0	5	3	126	85	109	31	39	32
B	0	5	0	126	60	126	41	43	33
C	0.5	1	0	126	93	126	38	33	32
D	0	3	0	126	87	126	34	39	33
E	0	1	1	126	87	126	34	33	32

Key: Ev. (Evaluation) | op (operative) | FIM (Functional Independence Measurement Scale).

and postoperatively. There was an increase in SPO₂ values, both at the end of each session and in the final assessment at discharge, the transition from ineffective cough to effective cough with the expulsion of secretions, a decrease in respiratory rate (at the end of each session and during hospitalization), effective weaning from oxygen therapy (participant B) and improvement of breathing pattern, and therefore improvement of ventilatory dynamics (participant B and C). In addition, the Modified Borg Scale scores at discharge decreased to 0 – “no” feeling of dyspnea/fatigue (participants B, C, D), 1 – “very, very mild” (participant E), and 3 “moderate” (participant A, who was discharged on the 2nd postoperative day) (Table 3).

Regarding the application of the FIM, in all participants, a decrease in scores was observed on the 1st postoperative day, with a progressive increase in scores throughout hospitalization, with a return to complete/modified independence at the date of discharge (Table 3).

Most participants (except participant A) had higher scores on the Zung Anxiety Self-Assessment Scale preoperatively compared to the results obtained at discharge. Three participants (A, B, and D) showed an increase in scores on the 1st postoperative day, unlike the remaining participants (C and E) where there was a gradual decrease in scores from the preoperative period to the discharge date (Table 3).

Taking into account the assessment of the participants’ perception of pain through the application of the Numerical Pain Scale [9], the scores increased on the 1st postoperative day, and a subsequent decrease in pain intensity was observed between the 1st postoperative day and the day of hospital discharge, as well as differences between the beginning and end of the sessions, with an improvement in the scores obtained (Table 4).

Regarding the use of the incentive spirometry technique, it was found that on the 1st postoperative day in all participants there was a decrease in the values of inspired air volume concerning the values obtained preoperatively, with an increase in the values of inspired air on the date of discharge in all participants, returning or approaching the values obtained preoperatively (Table 4).

Table 4. Assessment results data regarding the Incentive Spirometry and Numerical Pain Scale technique

	Incentive spirometry			Numerical Pain Scale					
	1st Ev (pre-op)	2nd Ev (1st day post-op)	3rd Ev (Discharge)	1st Ev (pre-op)		2nd Ev (1st day post-op)		3rd Ev (Discharge)	
				Session start	Session end	Session start	Session end	Session start	Session end
A	3500	1750	2500	0	0	6	4	4	3
B	4000	2500	4000	0	0	4	3	0	0
C	2000	1750	2000	0	0	2	2	2	1
D	1500	1000	1250	0	0	0	0	0	0
E	3500	2000	2750	0	0	5	4	3	2

Key: Ev. (Evaluation) | op (operative).

4 Discussion

The rehabilitation nursing program applied in the study started in the preoperative period and included a set of interventions based on the teaching and training of different techniques. The role of the RESN in the preoperative period is justified by the responsibility for a comprehensive assessment and data collection about the patient, in order to identify specific needs and risk factors inherent to the surgical procedure [11]. Thus, the beginning of the rehabilitation process should be as early as possible, always in the preoperative period, for the prevention of postoperative complications [8], and the educational component is an essential element to speed up the person's recovery process [11].

Corroborating the above, there is a study that involved the application of a set of rehabilitation interventions that included teaching and exercise training in the preoperative period of abdominal surgeries, which concludes that there is a decrease in postoperative complications in the group subjected to the intervention [15].

All participants showed great motivation, receptivity, and collaboration in terms of adherence and active participation in the proposed rehabilitation program. The interventions performed in the preoperative period are important to the extent that the person becomes aware of a set of knowledge, as well as assumes a certain responsibility for its operationalization [11], promoting self-responsibility for his/her recovery process. Authors denote the importance of preoperative monitoring as a stimulus for the person to collaborate with the interventions developed in the postoperative period, aiming at reducing the length of hospital stay and reducing complications resulting from surgical intervention [8].

Through the obtained results, it can be observed in all participants a worsening of the respiratory function on the 1st postoperative day, with a noticeable increase in the scores of the Modified Borg Scale. These facts are justified by a set of pathophysiological mechanisms that determine the occurrence of postoperative complications, such

as lung hypoinflation that occurs during surgery, prolonged immobility time, temporary diaphragmatic dysfunction, and alteration of mucociliary function with decreased cough effectiveness that result in an accumulation of secretions [7]. Adding that these phenomena also promote the reduction of functional residual capacity and vital capacity for some days after the surgical intervention [7].

The recovery of respiratory function was evident in all participants during hospitalization, taking into account the assessments made at the beginning and end of each session, with improvement or stabilization of all assessed parameters. Corroborating these results, the authors demonstrate through their study the gains obtained from a respiratory functional re-education program in the person submitted to abdominal surgery regarding the immediate benefits associated with SPO₂ [20].

Recent investigations in the scope of the rehabilitation of the person submitted to abdominal surgery, corroborate the results obtained, concerning the gains at the level of respiratory function from the application of specific techniques of respiratory functional re-education, for the control and prevention of postoperative complications [14, 15, 21, 22].

One of the interventions developed in the implemented program consisted in the teaching and training of directed cough with the contention of the surgical wound, which according to the results obtained (namely the transition from ineffective to effective cough), can be said to bring benefits in the effectiveness of cough and expulsion of secretions produced. Factors such as anesthesia, immobility, pain, and decreased strength of the respiratory muscles are detrimental to the effectiveness of cough in the postoperative period [13]. This premise confirms the results obtained, in the sense that we verified the presence of ineffective cough in most participants on the 1st postoperative day. Corroborating the results obtained, studies consider the same intervention as an integral and fundamental part of a pre and post-surgical rehabilitation program, being beneficial and efficient for the person and, combined with early mobilization (also a constant intervention of the implemented program) provides pulmonary re-expansion, improving the recovery of pulmonary functions in the postoperative period [9].

The incentive spirometry technique, applied during the intervention program as a mechanical resource of respiratory functional re-education, is a technique widely recognized as beneficial in preventing postoperative complications of abdominal surgeries, considering its effects of lung re-expansion, strengthening of respiratory muscles and maintenance of airway patency [13, 16, 19].

Through the study developed, positive results were obtained regarding the use of incentive spirometry, being visible through the values of inspired air volume verified between the preoperative period, on the 1st postoperative day, and in the final assessment at discharge. On postoperative day 1, a decrease in inspired air volume values was observed in all participants, justified by the change in the dynamics of the diaphragmatic excursion caused by manipulation of the abdominal cavity and inhibition of the phrenic nerve with consequent changes in the breathing pattern and the correct use of diaphragmatic muscles [8, 13, 16]. However, given the continuity of incentive spirometry training throughout hospitalization, an increase in inspired air values was observed at the time of discharge in all participants, returning or approaching the values obtained in the preoperative period. These results prove the effectiveness of this technique in improving

respiratory muscle strength and diaphragmatic dynamics. A recent study corroborates the above, showing significant results in the variables respiratory muscle strength, changes in volume and time of the breathing pattern, and diaphragmatic activity, thus confirming the effectiveness of incentive spirometry in the gradual recovery of thoracoabdominal dynamics and consequently in the prevention/recovery of postoperative complications of abdominal surgery [16].

Confirming the results obtained concerning respiratory function evaluation, it is unanimous among several authors, through research studies carried out in this area, to consider the effectiveness of respiratory functional re-education interventions in the recovery of respiratory functionality in general, in the prevention of postoperative complications, and the consequent reduction of hospital stay, when applied to the person undergoing abdominal surgery [14, 15, 21–23].

Concerning cardio-circulatory function, the RESN performs a preponderant activity in its optimization, maintenance, and/or recovery [11]. Taking into account the need to comply with bed rest in the postoperative period of the surgical procedure, the RESN should take into consideration the risks that this period of immobility may entail for the cardio-circulatory system, as well as its interference with respiratory and motor dysfunctions [8, 11].

Supporting the interventions developed in the implemented program (from the encouragement and training of the active mobilization of the different body segments during the period of bed rest, the early lifting instituted to all participants on the 1st postoperative day, and the gait training), the literature proposes a set of strategies to mitigate the risks arising from immobility, such as the earliest possible mobilization and lifting, and the gait/walking training [7–9, 13, 19].

A recent study shows that progressive mobilization on the same day of surgery, taking into account the assurance of hemodynamic stability and post-surgical safety conditions, presents benefits favoring increased oxygenation, preventing postoperative complications, and accelerating overall functional recovery [18].

A surgery, which aims to improve the person's quality of life, may represent a threat to their ability to meet their basic needs [11]. Taking into account the physical limitations resulting from surgical intervention, whether due to the immobility time resulting from the need for bed rest, the presence of surgical sutures and abdominal drainage systems, pain, anxiety, and possible changes in respiratory function, it is imperative to develop a set of interventions that lead to the empowerment of the patient's autonomy and independence in performing the different activities of life. Given this premise and in order to objectively translate the results of the developed interventions included in the proposed intervention program, the FIM assessment instrument was used to assess the participants' performance in the 18 motor and cognitive activities of daily living.

In all case studies, positive results from the application of the developed intervention program were verified, regarding the maximization of functionality and empowerment of the person for self-care. Through the application of the FIM, a decrease in scores on the 1st postoperative day was observed, with a progressive increase in scores throughout hospitalization, with the return to complete independence at discharge in all participants, except for participant A, who reached modified independence as he required supervision

in the performance of self-care tasks “personal hygiene”, “bathing”, “mobility”, and “locomotion” and minimal help in self-care task “dressing the lower half”.

The painful symptomatology induced by tissue damage caused by the surgical procedure itself, as well as the pain related to the surgical suture are considered to have a negative influence on the postoperative recovery of patients who had undergone abdominal surgery [8]. Pain was perceived by most participants in the sample under study, having occurred in all of them on the 1st postoperative day (except for participant D, who never mentioned pain sensation, assigning a pain grade of 0 according to the Numerical Pain Scale in all assessments).

A decrease in pain intensity was observed between the 1st postoperative day and the day of hospital discharge, as well as differences between the beginning of the sessions and the end of the sessions, with an improvement in pain intensity. This fact leads to considering the positive influence of the rehabilitation program implemented in pain control. An investigation carried out within the scope of rehabilitation in the postoperative period of abdominal surgeries corroborates the data obtained, adding that not only analgesia but also respiratory functional re-education interventions contribute to pain reduction and, consequently, improve the patient’s recovery, reducing the length of hospital stay [18].

A recent study also supports the results and respective considerations described above, stating that a functional respiratory re-education program induces benefits in pain control, especially when the levels of pharmacological analgesia are lower [21]. It is important to highlight the fact that the incentive to adopt non-pharmacological pain relief methods such as guided visualization [13] combined with respiratory functional re-education interventions was promoted during all sessions, as well as the excellent adherence to the use of this method by most participants.

Anxiety is seen as a reality experienced by most people undergoing a surgical procedure [10]. This is a diagnosis often identified in the preoperative period, due to stress factors such as diagnosis, surgery, anesthesia, pain, fear of dying, separation from their familiar environment, surgical recovery, and fear of possible dependence on others [10, 17]. High levels of anxiety are associated with poorer physiological outcomes and quality of life after surgery, contributing to longer hospital stays [17].

According to the results obtained, most participants (except participant A) showed higher levels of anxiety preoperatively compared to the results obtained at discharge, according to the application of the Zung Anxiety Self-Assessment Scale. Authors argue that a certain level of anxiety should be considered desirable, driving the person to act by asking relevant questions about the surgical procedure itself or specific issues related to preoperative preparation or hospital stay, accepting the guidelines and restrictions imposed by the multidisciplinary team [10].

Taking into account that the scores obtained in the preoperative period were not higher than 40 (value above which the authors of the scale consider pathological anxiety - "sick population") in all participants except participant B, who obtained a score of 41, it may be concluded that most participants had anxiety levels considered acceptable and beneficial to their preoperative experience. This premise can be confirmed by the excellent collaboration, receptiveness, and motivation shown by participants when they were proposed to participate in a rehabilitation nursing program.

Three participants (A, B, and D) had increased scores on the first postoperative day, corresponding to increased anxiety levels, whereas the others (C and E) had gradually decreased scores from the preoperative period to discharge, thus associated with a gradual decrease in anxiety levels.

The increase in anxiety levels observed in participants A, B, and D on the first postoperative day is associated with changes induced by the surgical procedure, namely changes in respiratory function, pain, and immobility.

Throughout the rehabilitation nursing intervention program developed, in addition to breathing exercises, which, according to authors [17], are beneficial in controlling anxiety, the provision of informative guidelines on aspects such as the expected time of surgery, the circuit to be performed to the operating room, expected duration of surgery, location of the surgical incision and probability of abdominal drainage and respective care to be taken were emphasized, as well as a brief description of the events/routines expected to occur throughout hospitalization, considering and believing that understanding this information can mitigate the fear/anxiety about the unknown so often verbalized by the person. In addition, at the end of each session, a moment of relaxation was promoted through the adoption of rest and relaxation techniques associated with awareness and control of breathing times, to promote the reduction of psychological and muscular tension induced by states of anxiety [13].

As a result of the implemented interventions, positive results were obtained with regard to anxiety control progressively throughout the hospital stay, through the observation of lower anxiety levels at discharge. The fact that the return to functional independence was aimed at all participants is considered an influence on the decrease in anxiety levels. These results and findings are corroborated by authors [17] who associate high levels of stress and anxiety with the patient's inability to perform daily activities, thus impairing quality of life, and argue that the "physical and mental stress" caused by surgery should be considered in rehabilitation programs.

In general and taking into account the variables under study that were discussed here, we believe that the implementation of the proposed rehabilitation nursing intervention program enhanced the general functionality, maximized autonomy, and promoted the participants' empowerment, thus contributing to a positive post-surgical experience.

5 Conclusion

This study shows that the implementation of a set of specialized rehabilitation nursing care in patients undergoing surgery has beneficial effects in terms of regaining functional independence and anxiety control in patients undergoing abdominal surgery. The study participants showed gains in terms of self-care performance, respiratory function improvement, anxiety symptoms control, and postoperative pain control, considering the assessments performed in the preoperative period, on the first postoperative day, and at hospital discharge. These gains translate into improved functionality in general for people undergoing abdominal surgery, as well as the prevention of post-operative complications, reduced length of stay, prevention of post-operative hospital re-admissions, and early return to daily life and work.

From the final production of positive results through the study developed, it should be taken into account the limited number of participants in the sample, so the generalization

of results may not be feasible; however, the continuation of studies in this direction may allow it. It is suggested that further research should be conducted in this area by rehabilitation nursing professionals so that the impact of the differentiated intervention of the RESN on health gains for people undergoing surgery can be further demonstrated.

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Rehabilitation Nursing in the Person with Self-care Deficit Due to Respiratory Alterations - Systematic Review of the Literature

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Abstract. Background: Respiratory rehabilitation is a key area in the treatment, prevention and recovery of all morbidities that affect the respiratory system. The development of a set of specialized and scientific knowledge in rehabilitation nursing provides an improvement in the care provided, enhancing the person's capacity for self-care, allowing for a more harmonious adaptation process to the state of functional dependence, promoting health gains.

Objective: To investigate the sensible gains from rehabilitation nursing interventions that promote self-care in people aged 65 and older with respiratory alterations.

Methodology: A systematic review of the literature was conducted by searching the EBSCO Host Web database for studies with the following descriptors, extracted from the Medical Subjects Heading [MeSH] vocabulary: [[nursing] or [nursing care] or [nursing interventions]] AND [[respiratory tract diseases] or [respiratory therapy] or [respiratory rehabilitation] or [dyspnea] or [pulmonary disease]] AND [[rehabilitation] or [rehabilitation nursing] or [quality of life]] AND [[self-care] or [health self-care]]. During the month of October 2021, the research was conducted, using a chronological frieze from 2011 to 2021.

Results: A total of 7 studies were obtained, reflecting sensible gains in the care provided by the RNSN (Nurse Specialist in Rehabilitation Nursing) to the person with respiratory alterations.

Conclusions: Several sensible gains of Rehabilitation Nursing in people with respiratory pathology were identified, demonstrating the importance of a specific and directed intervention for patients with respiratory alterations.

Keyword: Nursing · Rehabilitation · Respiratory changes · Self-care

1 Introduction

Aging is a natural process in the life cycle. In an ideal scenario, the human being lives healthy, autonomously and independently throughout his life, however, we have seen that from 65 years of age women and men see their average life expectancy increased

and, consequently, the years of unhealthy life are worrying; 83 years with 15.1 years of unhealthy life and 78 with 10.4 years of unhealthy life, respectively [1]. It is easy to understand these values, we live longer with the improvement of sanitary conditions, medical and technological advances, which provided an increase in survival in diseases and potentially fatal traumas [2], and however, it brought with it a higher prevalence of dependence of the population [3].

Giving quality to the years of unhealthy life should be a priority for governments in their health systems, so that the growing needs of this new paradigm are met. Faced with a society that is progressively more dependent, less functional and in need of increasingly specialized care, there is an urgent need for specific care in rehabilitation nursing, which allows for a more effective response to the challenges of this new reality, in order to obtain health gains [2].

In Portugal, “Promote health and well-being, participation, non-discrimination, inclusion, safety and re- search to increase the functional capacity, autonomy and quality of life of people as they age” is the mission of the National Strategy for Active and Healthy Ageing 2017–2025 [4]. In this sense, the elderly population needs an intervention aimed at promoting their health, not just curative intervention. It is urgent to promote functionality, avoid unnecessary hospitalizations, waste of resources, and stress on the care- giver/family, increase of potentially avoidable dependencies, contributing to the improvement of quality of life, for a fairer and more caring society [5].

Improving the functionality of the elderly should be the basis of intervention, because changes in this area imply changes in self-care, that is, in the ability of the human being to take care of himself/herself in all dimensions, according to Orem’s perspective. Thus, through this improvement we give the person their fundamental right of Human Dignity. It is in the analysis of disability indicators, especially those referring to activity limitation and functional capacity, that health care needs can be defined [6]. In this sense, based on the ICF (International Classification of Functioning), the Elderly Nursing Core Set (ENCS) was created to understand the real needs of the elderly person. The nurse plays a guiding role in this multidisciplinary assessment, in which the functionality of the elderly person is assessed in its different interactions, either with their context or in the complex relationships between environmental and personal factors and the elderly person’s health condition. The focus is on maintaining autonomy and/or promoting the re-adaptation to the deficits that have been established at the self-care level, perceiving the participation of the elderly person in a multifactorial dimension [6].

Chronic respiratory diseases have a major impact on self-care. The National Observatory for Respiratory Diseases (NORD) refers to their high prevalence, and in Portugal they affect about 40% of the population, accounting for about 19.3% of hospitalizations and about 11.8% of deaths [7]. These values become very worrying since pneumonias are one of the diseases with the highest incidence, despite being a potentially curable pathology.

Respiratory diseases bring about a series of disabilities in which respiratory rehabilitation is essential in care. As the third European country with the highest aging rate, combined with deficits in health promotion and disease prevention, weak investment in health education and practically non-existent respiratory rehabilitation, which should be

part of the therapeutic plan for all symptomatic chronic respiratory patients, the intervention in this field is emergent [7, 8]. These disease situations usually have a chronic typology, which extends over time and causes early dependence. The impairment of self-care and the frequent acute episodes will change the whole family dynamics, subjecting the patient to a growing need for support and care from third parties, namely family caregivers. These impairments are well known, so Respiratory Rehabilitation (RR) plays an essential role in care, since it has a direct impact on the performance of self-care and quality of life of the patient and family. The beneficial effect of RR can be seen in the prognosis of the disease, in the decrease in the number of (re)hospitalizations, in the lower mortality rate and in the greater profitability of health resources. Thus, it is the RNSN's competence to respond to this situation, assessing and intervening according to the context or pathological situation of the respiratory patient [8].

It is clear that the provision of excellent care in rehabilitation nursing brings health gains in all contexts. In terms of respiratory patients, an effective intervention is urgently needed to prevent disabilities and enhance capabilities lost and/or minimized by chronic or acute disease processes that lead to functional deficits. Through this specialized care, it is possible to provide the person with greater autonomy, allowing for a new way of life for both the patient and his/her family.

The RNSN intervention allows for a better management of respiratory disease [8], being considered one of the priority research areas in Rehabilitation Nursing. The study within the scope of the physiological processes in respiratory function, the adaptive processes in dependence in self-care at home, as well as the effectiveness of the interventions of Rehabilitation Nursing allow for a greater structure of the body of knowledge and prioritization of research areas [10]. As such, this systematic review becomes relevant due to the need to investigate which are the sensible gains from the interventions of Rehabilitation Nursing promoting self-care in people aged 65 years and older with respiratory changes, i.e. how the intervention of the RNSN promotes health gains.

2 Methodology

This document is a systematic literature review (SLR), created to answer an assumed relevant research question. The SLR aggregating a large amount of information in a single study becomes one of the foundations for evidence-based practice [11]. Comprehensiveness, transparency, methodology and replicability are inherent characteristics of systematic reviews [12].

A systematic review is a research article that systematically identifies all relevant published and un-published articles concerning a research question, using predefined methods, evaluating the quality of those articles, extracting the relevant data in order to synthesize the results found. In this way, it makes scientific research less expensive [13].

The enunciation of the research question is the starting point for evidence-based practice, and is the most challenging phase, because a correctly defined question will outline the entire course of the investigation, guiding the research in order to obtain results relevant to the problem at hand [14].

The research strategies used in the development of this systematic review were based on the Joanna Briggs Institute [JBI] methodological design and the PICOD model [Patient/Problem, Intervention, Comparison, Outcome, Design] (Table 1).

Table 1. PICOD research question

P	Population	Who was studied?	People aged 65 and older	Keywords: Nursing; Rehabilitation; Respiratory tract diseases; Self-care Keywords: Nursing; Rehabilitation; Respiratory tract diseases; Self-care
I	Intervention	What was done?	Rehabilitation Nursing Interventions	
C	Comparisons of Interventions	Comparisons of results	Does not apply	
O	Outcomes/ Results	What were the results?	Promotion of self-care	
D	Study Design	What is it like?	Fully published quantitative studies	

Next, the research question was defined based on the PICOD model: “What are the sensible gains from Rehabilitation Nursing interventions promoting self-care in people aged 65 years and older with respiratory disorders?”. During the month of October 2021, a search was conducted in the EBSCO Host Web database using validated descriptors in the English language Medical Subjects Heading (MeSH) vocabulary: [[nursing] or [nursing care] or [nursing interventions]] AND [[respiratory tract diseases] or [respiratory therapy] or [respiratory rehabilitation] or [dyspnea] or [pulmonary disease]] AND [[rehabilitation] or [rehabilitation nursing] or [quality of life]] AND [[self-care] or [health self-care]]. The chronological frieze used, 2011 to 2021, and as a limiter contain full text.

As can be seen in the Prism 2020 Flow Diagram (14) (Fig. 1) 336 articles were found, and after applying the full text limiter 66 articles remained, the chronological crimp was also applied, and a total of 41 articles were identified.

These 41 articles were then analyzed by two independent reviewers, who analyzed the title, abstract, methodology, results, and conclusion. The following inclusion criteria were applied: study of people aged 65 or older with respiratory pathology, reference to nursing interventions related to self-care. Articles whose methodology was dubious and which did not answer the original question were also excluded. Finally, seven articles were selected and critically analyzed according to the criteria of the Joanna Briggs Institute.

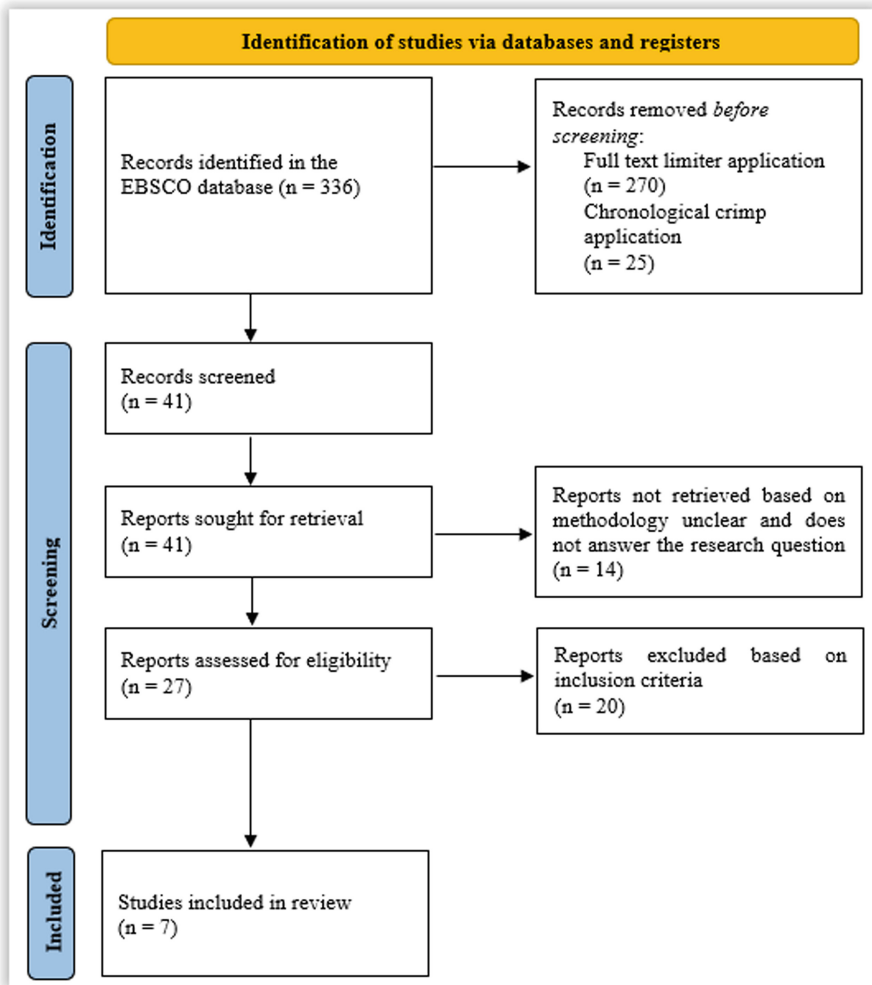


Fig. 1. Research methodology developed through the Prism 2020 Flow Diagram

3 Results

After selecting and assessing the quality of the articles found in the databases, seven articles were included in this systematic review, which are described in Table 2, in order to better understand their content.

The different articles analyzed allowed us to report on the main objectives of Rehabilitation Nursing, namely improving functionality, promoting independence and autonomy, leading to the person's satisfaction. After a detailed analysis of the different articles, it was possible to identify several indicators that are sensitive to Rehabilitation Nursing care, and group them into outcome indicators, as shown in Table 3.

Table 2. Characteristics and synthesis of the selected articles

Title/ Source/Authors/ Methodology/ Participants/ Level of Evidence	Objectives	Results/ Conclusions
<p>Title—The effect of a nurse-led self-management program on outcomes of patients with chronic obstructive pulmonary disease</p> <p>Origin—China</p> <p>Authors – Lian Hong Wang, Yan Zhao, Ling Yun Chen, Li Zhang, Yong Mei Zhang</p> <p>Methodology –Randomized controlled, single blind clinical trial</p> <p>Description methodology - Participants in the intervention group underwent a nurse-led self-management program in addition to routine care, and participants in the control group received routine care only. The main outcome measures were COPD-related readmission and emergency department visits, the 6 min walk distance test (6MWD) to measure exercise capacity, the St George Respiratory Questionnaire (SGRQ) to measure health-related quality of life, and the COPD Transitional Care Patient Satisfaction Questionnaire (CTCPSQ) to measure satisfaction. Data collection was performed at the beginning of the study (T1) and after 3 (T2), 6 (T3) and 12months (T4)</p> <p>Participants –154</p> <p>LEVEL OF EVIDENCE – 1c</p>	<p>Verifying the effectiveness of a nurse-led self- management program in outcomes of patients with chronic obstructive pulmonary disease (COPD)</p>	<p>Compared with the control group, participants in the intervention group showed significantly fewer COPD- related hospital admissions (P = 0.03) and emergency department visits (P = 0.001) and higher CTCPSQ total scores (P = 0.001) at 12 months. Meanwhile, analysis of variance showed significantly greater improvement in exercise capacity and health status over time in the nurse- led program group than in the control group, P < 0.001</p> <p>Conclusions: This study demonstrated that the nurse- led self-management program was effective in reducing hospital readmissions and emergency department visits and in improving exercise capacity, health-related quality of life, and satisfaction for patients with COPD</p>

(continued)

Table 2. (continued)

Title/ Source/Authors/ Methodology/ Participants/ Description/ Level of Evidence	Objectives	Results/ Conclusions
<p>Title – Eficacia de una intervención educativa a pacientes con enfermedad pulmonar obstructiva crónica y sus cuidadores</p> <p>Origin - Spain</p> <p>Authors– Núria Aresté Albà, Joan Torres Puig-Gros</p> <p>Methodology – Quasi-experimental study before-after</p> <p>Description methodology - A preliminary quasi-experimental before-and-after study was conducted in patients diagnosed with COPD > six months and their caregivers at the Fraga Health Center (Huesca), where an educational intervention was carried out, analyzing its effectiveness immediately after, at one month, at three months and at six months, in terms of knowledge, attitudes and skills</p> <p>Participants –13 patient and 7 caregivers</p> <p>LEVEL OF EVIDENCE – 2d</p>	<p>To evaluate the impact of an educational intervention on Patients with Chronic Obstructive Pulmonary Disease (COPD) and their caregivers</p>	<p>Results: There was a reduction in monthly visits to the Emergency Department, and the mean score on the knowledge test before the intervention was 16.8 (SD: 1.9) (patients 17.0 and caregivers 17.3), increasing to 18.5 (SD: 2) (patients 18.6 and caregivers 18.3) six months after the intervention. There was an increase in the number of patients who received the 23-valent pneumococcal vaccine. The test of inhaler use had an increase of 3 points in the mean scores for each type of inhaler. A statistically significant increase was observed in the level of knowledge at different time points, and in the use of pressurized cartridge inhalers at different time points, for those who came accompanied. Conclusions: although the sample size is small, an increase in knowledge, better handling of inhaler use and increased coverage of 23-valent pneumococcal vaccine were observed</p>
<p>Title – Evaluation of a Nurse-Led Educational Telephone Intervention to Support Self-Management of Patients With Chronic Obstructive – Pulmonary Disease: A Randomized Feasibility Study</p> <p>Origin–United Kingdom</p> <p>Authors– Julia Billington, Samantha Coster, Trevor Murrells, and Ian Norman</p> <p>Methodology – Randomized trial</p> <p>Description methodology - 73 patients were randomly assigned to either a control group that received standard care including a self-management plan or an intervention group that received, in addition, two scheduled phone calls during six weeks from a nurse. The calls were tailored to the patient's needs but provided medication about the use of their plan to manage exacerbations, use of health services and emergency medications</p> <p>Participants – 73</p> <p>LEVEL OF EVIDENCE – 1c</p>	<p>The aim of this study was to examine whether a telephone-based support intervention designed to promote the use of their self-management action plan increased patient well-being and reduced symptom severity in UK primary care settings. Specific objectives were to determine: 1) feasibility of the study procedure, 2) feasibility of the intervention, 3) potential effect sizes of the intervention and 4) costs of delivering the intervention</p>	<p>This study is the first known randomized trial in the UK investigating the impact of nurse-led telephone-enhanced self-management plans, but without multi-component self-management training. Such programs, even if proven to be beneficial in terms of patient knowledge and self-efficacy, are often challenging to deliver to an elderly population and in a national health service with limited financial and work-force resources. Further and larger studies are needed to confirm the effectiveness and cost-effectiveness of a low-cost phone-based nursing intervention to support patients' use of COPD self-management plans</p>

(continued)

Table 2. (continued)

Title/ Source/Authors/ Methodology/ Participants/ Description/ Level of Evidence	Objectives	Results/ Conclusions
<p>Title - Telecare for Diabetes, CHF or COPD: Effecton Quality of Life, Hospital Use and- Costs. A Randomised Controlled Trial and Qualitative Evaluation Origin - New Zealand Authors – Timothy W. Kenealy, Matthew J G. Parsons, A. Paul B. Rouse, Robert N. Doughty, Nicolette F. Sheridan, Jennifer K. Harré Hindmarsh, Sarah C. Masson, Harry H. Rea Methodology – Randomized Clinical Trial Description methodology - Patients were randomly assigned to usual care or to additionally enter their data into a commercially available electronic device that uploaded data once a day to a nurse-led monitoring station. Patients had congestive heart failure (Site A), chronic obstructive pulmonary disease (Site B) or any long-term condition, primarily diabetes (Site C). Site C contributed only intervention patients - they considered a usual care option unethical. The study took place in New Zealand between September 2010 and February 2012 and lasted from 3 to 6 months for each patient. The primary endpoint was health-related quality of life (SF36). Data on experiences were collected through individual and group interviews and a questionnaire Participants – 171</p> <p>LEVEL OF EVIDENCE – 1c</p>	<p>To evaluate the effect of telecare on health-related quality of life, self-care, hospital use costs, and experiences of patients, informal caregivers, and health professionals</p>	<p>Quality of life, self-efficacy and disease-specific measures did not change significantly, while anxiety and depression decreased significantly with the intervention. Hospital ad- missions, days in the hospital, emergency department visits, outpatient visits, and costs did not differ significantly between the groups. Patients at all sites were universally positive. Many felt safer and cared for and said that they and their families had learned more about how to manage their condition. All staff could see the potential benefits of telecare, and after some initial technical problems, many staff felt that telecare enabled them to monitor more patients effectively. Conclusions: Strongly positive patient and staff experiences and attitudes complement and contrast with small or non-significant quantitative changes. Telecare caused patients and their families to take a more active role in self-management. It is likely that subgroups of patients have benefited in ways that have not been measured</p>

(continued)

Table 2. (continued)

Title/ Source/Authors/ Methodology/ Participants/ Description/ Level of Evidence	Objectives	Results/ Conclusions
<p>Title – Supporting health behavior change in chronic obstructive pulmonary disease with tele-phonehealth-mentoring: insights from a qualitative study Origin - Australia Authors – Julia A E Walters, Helen Cameron- Tucker, Helen Courtney-Pratt, Mark Nelson, Andrew Robinson, Jenn Scott, Paul Turner, E Haydn Waltersand Richard Wood-Baker Methodology – Randomized controlled trial Description methodology - Community nurses trained as health mentors used a patient-centered approach with COPD patients recruited from general practice to facilitate behavior change using a framework of health behaviors: ‘SNAPPS’ Smoking, Nutrition, Alcohol, Physical Activity, Psychosocial Well-being and Symptom Management, via regular telephone calls over 12 months. Semi-structured interviews in a purposive sample investigated feedback on the counseling and behavioral changes adopted. Interviews were analyzed using thematic and interpretive content iterative approaches by two researchers. Participants – 90</p> <p>LEVEL OF EVIDENCE – 1c</p>	<p>This qualitative study investigated the health behavior changes adopted by participants with moderate or severe chronic obstructive pulmonary disease (COPD) recruited to a randomized controlled trial of telephone health coaching</p>	<p>Of the 90 participants allocated to health counseling, 65 (72%) were invited for interview at 12-month follow-up. The 44 interviewees, 75% with moderate COPD, had a median of 13 mentor contacts over 12 months, ranging from 5 to 20. The interviewed participants (n = 44, 55% male, 45% current smokers, 75% moderate COPD) were representative of the total group with a median age of 65 years, while 82% had at least one comorbidity. Telephone contact was highly acceptable and allowed for a good rapport. Participants rated ‘being heard by a caring health professional’ as very valuable. Three groups of participants were identified by attitude toward changing health behavior: 14 (32%) actively making changes; 18(41%) are open and making some changes and 12 (27%) are more resistant to change. COPD severity or current smoking were not related to group category. Targeting increased awareness of the effects of COPD, helping to develop and personalize behavior change strategies, even by those who are not actively making changes. Physical activity was targeted by 43 (98%) participants and smoking by 14 (74%) current smokers, with 21% reporting quitting. Motivation to maintain changes increased with mentor support Conclusions: The provision of telephone health counseling is feasible and acceptable for people with COPD in primary care. Health behaviors targeted by this population, primarily with moderate disease, were primarily physical activity and smoking reduction or cessation. Health coaching increased motivation and helped people develop strategies to make and sustain beneficial changes</p>

(continued)

Table 2. (continued)

Title/ Source/Authors/ Methodology/ Participants/ Description/ Level of Evidence	Objectives	Results/ Conclusions
<p>Title - Developing a specialist-nurse-led 'COPD in-reach service' Origin - England Authors – Kathryn Cope, Laura Fowler and Zara Pogson Methodology –Case Study Description methodology - Data collected during the development of the service were compared with data existing when no COPD service was available within reach. Data were compared on average length of stay, readmission rates, early assisted discharge, and patient experience Participants – 12 participants LEVEL OF EVIDENCE –3, d</p>	<p>- Improve the patient experience - Ensure that patients admitted with COPD were seen immediately by a respiratory specialist within 24 h of admission - Increase the number of patients discharged on an 'early assisted discharge' scheme - Reduce the number of readmissions for COPD, this being defined as patients who were admitted with in 30 days of discharge, having a primary diagnosis of COPD in both admissions</p>	<p>The COPD walk-in service reduced the average length of stay for COPD patients by 2.53 days and readmission rates were reduced by an average of 4.5 per month; 17% of patients were discharged with an early assisted dis- charge scheme and overall patients felt more prepared and ready for discharge. Holistic, individualized care aimed at empowering patients to self-manage their own conditions was successful in its attempt to reduce the burden on the health care system and empower patients to manage their own condition patient satisfaction reveals that patients felt much more prepared for discharge having the additional information and support that was provided</p>

(continued)

Table 2. (continued)

Title/ Source/Authors/ Methodology/ Participants/ Description/ Level of Evidence	Objectives	Results/ Conclusions
<p>Title – Facilitating education in pulmonary re- habilitation using the Living Well with COPD programme for pulmonary rehabilitation: a process evaluation Origin - Northern Ireland Authors– Denise Cosgrove, Joseph Mac Mahon, Jean Bourbeau, Judy M Bradley and Brenda O’Neill Methodology – Qualitative Study Description methodology - Adaptations to the Living Well With COPD(LWWCOPD) program were informed by focus groups, current practice, relevant research, and guidance documents. Pulmonary rehabilitation sites used the adapted program, the LWWCOPD program for pulmonary rehabilitation, to provide the educational component of pulmonary rehabilitation. Process evaluation was performed: elements included reach (patient attendance rates), dose delivered (amount of program delivered), dose received (health professional and patient satisfaction), and fidelity (impact on patient knowledge, understanding, and self-efficacy on the COPD Understanding Questionnaire). Descriptive statistics (mean, SD) were used to summarize the demographics and key data from the feedback questionnaires. Qualitative feedback on the program was collected and categorized Participants – 57 patients with COPD LEVEL OF EVIDENCE –3</p>	<p>-Adapt the Living Well with COPD (LWWCOPD) self-management program, for insertion into pulmonary rehabilitation; -Conduct a process evaluation of the adapted program</p>	<p>The process evaluation showed positive results: 62.3% of patients attended ≥ 4 education sessions (outreach); mean (SD) 90 (10)% of session content was delivered (dose delivered); most sessions were rated as excellent or good by health professionals and patients. Patient satisfaction was high: mean (SD) of Section B of the Under- standing COPD questionnaire: 91.67 (9.55)% (dose received). Knowledge, understanding and self-efficacy improved significantly: mean (95% CI) change: Section A of the Understanding COPD questionnaire: 26.75 (21.74 to 31.76) %, BCKQ 10.64 (6.92 to 14.37) % (fidelity) In conclusion, this rigorous process evaluation has demonstrated that the LWWCOPD for pulmonary rehabilitation can be used to provide high quality, consistent and equitable education sessions during inpatient and community-based COPD pulmonary rehabilitation</p>

Table 3. Sensitive indicators for RN care identified in the articles

Outcome Indicators	Sensitive indicators
Functional Status	<ul style="list-style-type: none"> – Increased exercise tolerance and capacity [16, 20]; – Improved physical fitness [20];
Empowerment for self-care	<ul style="list-style-type: none"> – Improved self-management [19, 21, 22]; – Empowerment for self-care [19, 21];
Professional/ personal relationship	<ul style="list-style-type: none"> – Improved implementation, encouragement, and follow-up [19]; – Improved satisfaction of needs [19];
Symptom control	<ul style="list-style-type: none"> – Improved perception of people towards the disease [21];
Personal satisfaction	<ul style="list-style-type: none"> – Improved emotional balance [19, 20]; – High satisfaction of people regarding the program [16, 18, 20, 22]; – High participation in the programs [22];
Utilization of health services	<ul style="list-style-type: none"> – Improved health status [22]; – Decreased need for health care services [16, 17, 21, 22]; – Decreased health care costs [22]; – Increased early discharge [22];
Knowledge empowerment	<ul style="list-style-type: none"> – Improved health education [17, 18]; – Improved knowledge about the disease [17]; – Improved knowledge about the use of inhalers [17]; – Improved adherence to therapy [17]; – Additional educational sessions [22];
Therapeutic adherence	<ul style="list-style-type: none"> – Increased smoking cessation [20]; – Improved inhalation techniques [17, 21]; – Improved understanding of therapy [17];
Capacity building for quality of life	<ul style="list-style-type: none"> – Improved quality of life [16];
Mortality	<ul style="list-style-type: none"> – Reduction of mortality [21]

4 Discussion

The implementation of RR programs contributes to the improvement of functional capacity, seen through the increase in exercise capacity [16, 20].

Talking about rehabilitation nursing care and the search for excellence in care is essential for patient satisfaction to be a priority. Promoting self-care, patient and family well-being, improving the patient's health status, motivation to comply with rehabilitation plans, and assistance in the disease process improve patient satisfaction. Several reviewed studies show that the implemented programs improve self-management and empowerment for self-care [19, 21, 22], which were driven by constant monitoring of the health professional, based on a relationship of trust [19] leading to greater emotional

balance [19, 20]. This relationship contributes to patient satisfaction [16, 18, 20, 22], thus allowing for a more effective participation in rehabilitation programs [22].

The in-depth and specialized knowledge that characterizes the RNSN leads to decisions that enhance the person's functionality, in order to prevent complications and avoid disabilities, minimizing the impact of disabilities on the different physiological functions, providing an improvement in people's perception of the disease [21], through the education of the person and significant persons, planning discharges, providing continuity of care, promoting reintegration into the community, providing the person with dignity and quality of life [23–25]. This differentiated care translates into improved health status [22], reduced need to use health services [16, 17, 21, 22], reduced health costs [22] and increased early discharge [22].

Knowledge about the disease process is the basis for a greater ability to manage their health condition, so the intervention of the rehabilitation nurse through educational programs is essential. Among the studies analyzed, several report improvement in health education [17, 18], knowledge about the disease [17], knowledge about the use of inhalers [17], improvement in therapeutic adherence [17], and additional educational sessions [22] when necessary.

Patients with greater health literacy about their disease process have a better understanding [17] of the aspects that influence the whole process, so it is essential to encourage therapeutic adherence through smoking cessation [20] and improvement in inhalation techniques [17, 21]. This training on strategies to manage their health/disease process promotes quality of life [16] and a reduction in mortality [21].

The care models to be adopted in order to obtain health gains should be based on the assessment of the person's functionality in all its aspects [26–29] and be person-centered in order to improve not only physical health, but also mental health, which in turn influences rehabilitation [30–32].

It is through reflection on our intervention, based on the most recent scientific evidence, that an improvement in the care provided is achieved, being the basis for establishing safe and quality rehabilitation plans. It also allows us to organize care more effectively, achieving excellence of care and ensuring the effectiveness of the RNSN's intervention in respiratory patients, contributing to an important improvement in the quality of life of patients and their loved ones.

5 Conclusion

This SLR highlighted the importance of the RNSN's intervention in respiratory patients and in the development of self-care, so that practice is increasingly supported by scientific evidence, oriented towards the gains that are sensitive to nursing care, emphasizing patient satisfaction, well-being and self-care. The search for this SLR revealed some gaps in terms of information on the topic under study, corroborating the importance of prioritizing studies in this area of rehabilitation. Nevertheless, with this SLR, we were able to realize that the contribution of the RNSN is extensive and that, through its intervention, health gains are possible.

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Difficult Intravenous Access in Older Adults with Cancer: Can Vein-Locating Technology Be Key for Vessel Health?

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Abstract. While previous studies suggest that patient risk factors such as advanced age and cancer disease are accountable for difficult intravenous access (DIVA), very few studies have studied how the coexistence of both risk factors impacts care outcomes. We aimed to compare DIVA status and peripheral intravenous catheter (PIVC) related care outcomes in adults and older adults with cancer. A retrospective analysis was conducted using an existing dataset from a large Action-Research project conducted with the nursing team from a surgical oncology ward in Portugal. Study findings show that one in every three older adults is at moderate to high risk of DIVA. Compared to younger adults, this cohort is less likely to experience first-attempt success in PIVC insertion (69.7% versus 82%; $\chi^2(1) = 4.17, p = 0.046$), a higher number of consecutive puncture attempts ($t(198) = -2.67, p = 0.008$) and PIVC-related adverse events (23.6% versus 13.5%). These findings support the importance of formally conducting DIVA assessment in oncology settings, using structured approaches and instruments, as well as introducing vein-locating technologies such as ultrasound imaging and electrical stimulation technology that promote efficient, safe, and sustainable nursing practice.

Keywords: Older adults · Difficult intravenous access · Peripheral intravenous catheterization · Vein-locating technology

1 Introduction

Healthcare complexity is increasing exponentially in the ageing society, pressuring health organizations and professionals to address recurrent challenges with comprehensive, innovative, and evidence-informed solutions [1]. These principles are especially significant in vulnerable clinical cohorts such as cancer patients.

The latest epidemiological data shows that 9.8 million cancer patients around the world required antineoplastic treatment, and these numbers are expected to increase drastically to 15 million by 2040 [2]. During the same period, the number of cancer patients who will require surgery will rise from 9 to 14 million [3].

It is safe to assume that obtaining and maintaining vascular access is essential to guarantee a multitude of therapeutic and diagnostic procedures during cancer treatment, such as the delivery of intravenous drugs, blood collection, or contrast administration [4–6]. Amongst the different existing vascular access devices, none is more recurrent than the short peripheral intravenous catheter (PIVC), which is of detrimental importance in the care approach of cancer patients [4–6]. PIVCs are widely used in the delivery of intravenous chemotherapy, in infusion therapy during the perioperative period, or in palliative stages for the pharmacological control of associated symptoms.

However, PIVC insertion in cancer patients can be deemed a difficult procedure even for experienced healthcare professionals, compromising first-attempt success [7–9]. Difficult intravenous access (DIVA) leads to repeated insertion attempts, compromising vessel health and depletion of peripheral veins. Such a reality results in suboptimal care experience and outcomes for patients, frustration and care volume for health professionals, and increased care costs for health institutions [7–12].

Several independent patient and clinician risk factors have been associated with reduced odds of first-attempt success, among which patients' advanced age and current cancer diagnosis have been extensively identified by international authors [10–12]. Ageing-induced phenotypic and functional changes include depressed endothelial dilation, increased permeability of the endothelial layer (promoting the entry of circulating inflammatory mediators such as cytokines), cell senescence, and changes in proteins and glycosaminoglycans adherence to the endothelial cells, increasing the chance for thrombus formation [13]. On the other hand, antineoplastic treatments, such as chemotherapy, are known to produce rapid phenotypic and functional changes in the endothelium, which can lead to vasoconstriction, thrombosis and even cell apoptosis [14–16].

However, how the coexistence of both risk factors impacts care outcomes is understudied. To address this challenge, we aimed to compare DIVA status and PIVC-related care outcomes in adults and older adults with cancer. Furthermore, we discuss our findings considering recent evidence on standardized vessel assessment and the use of vein-locating technology.

2 Method

This study is a retrospective review of collected clinical data from a larger action-research study conducted in a surgical ward from a large tertiary oncology hospital in Portugal, from December 2019 to October 2021.

2.1 Inclusion Criteria

Patient recruitment followed a non-probability, consecutive, and based on convenience sampling technique, indicated by the ward's nursing team during the morning shift (9 am. to 1 pm.). Eligible patients had to be over 18 years of age, able to provide informed

consent and planned to return to the same ward after surgery. Patients with peripheral venous system damage, known intravenous drug addiction, or diagnosis of neurocognitive impairment were excluded from the study. Given that Portugal is a developed nation, the cohorts for the retrospective analysis were determined using the following cut-offs: i) adults, defined as people aged 18 to 64; ii) older adults, defined as people 65 and older.

2.2 Variables and Data Collection

The lead researcher observed the ward nurses' practices during PIVC insertion, including an initial assessment of their DIVA status. DIVA assessment was conducted by the nurse allocated to each patient using two previously validated instruments for the Portuguese population: i) the *Escala Nacional de Acessos Vasculares* (ENAV); and ii) the *Escala A-DIVA Modificada* (A-DM scale) [17, 18]. The ENAV is a "performance status tool" that requires healthcare professionals to classify a patient's peripheral intravenous access according to the number of observable puncture points, PIVC's size and the ease with which venipuncture can be performed, and the risk of extravasation or phlebitis. With each grade, the chance of having challenging intravenous access gradually increases [17]. Contrastingly, the A-DM scale bases its evaluation on five factors: i) the patient's DIVA history; (ii) the healthcare professional's expectation of DIVA before an attempt at PIVC insertion; (iii-iv) the inability to palpate or otherwise observe a dilated vein; and (v) the target vein's diameter being less than 3 mm. The scale's score (which ranges from 0 to 5) is increased by one point for each confirmed item; a higher score denotes a higher risk of DIVA and unsuccessful PIVC insertion [18].

After this initial assessment, the lead researcher would then proceed to observe the nurses' practices in PIVC insertion. When required, oral clarification was requested by the lead researcher. After a successful attempt at PIVC insertion, the main researcher would walk to another private room in the ward and complete a standardized checklist created by the research team. To reduce the likelihood of bias and missing data, all the study's data were gathered by a single individual. The checklist comprised variables focused on patients' demographic and clinical status, catheter insertion-related outcomes (e.g., selected puncture site, catheter gauge size, number of puncture attempts until success, nurse-reported ease of puncture through a Likert Scale ranging from 1 "not at all difficult" and 7 "extremely difficult" points), and catheter maintenance-related outcomes (e.g., the reason for premature failure).

During the subsequent admission days, the research team conducted daily bedside audits to assess PIVC integrity and observe nurses' maintenance practices. If the catheter was prematurely removed due to adverse events (e.g., phlebitis, infiltration, occlusion, accidental removal), the signs and symptoms reported by the ward nurses were retrieved for analysis and subsequent classification. Patients were dismissed from the study once the inserted PIVC was removed due to clinical judgment or premature failure.

2.3 Ethics

All included patients were also informed of the ongoing study by the lead researcher, who ensured their voluntary and informed consent to participation. All collected data were anonymized to comply with current data privacy regulations. This study was approved by

the hospital's board after a favourable review by its Ethics Committee (ref. TI 24/2019, approved on 19 September 2019).

2.4 Data Analysis

Data analysis was undertaken using SPSS Statistics® (version 24, IBM SPSS; Chicago, IL, USA). Baseline data were represented as means, standard deviations, frequencies, and percentages. Continuous variables were compared using the independent-samples T-Test, while proportions were compared using Pearson's Chi-Squared test. Statistical significance levels were considered for p-values below 0.05.

3 Results

A total of 200 oncology patients were recruited during the study period, mostly women ($n = 189$), admitted for surgery related to breast cancer ($n = 140$), followed by colorectal cancer ($n = 13$) and implant removal ($n = 2$). The patients' demographic and clinical variables are presented in Table 1 per age group.

Table 1. Demographic and clinical characteristics of the study participants ($n = 200$).

Demographic and clinical variables	Groups	
	Adults ($n = 111$)	Older adults ($n = 89$)
Sex		
Male	4 (3.6%)	7 (7.9%)
Female	107 (96.4%)	82 (92.1%)
Known medical diagnosis		
Arterial Hypertension	26 (23.4%)	56 (63%)
Dyslipidemia	8 (7.2%)	28 (31.5%)
Type 2 Diabetes Mellitus	3 (2.7%)	30 (34%)
Depression	10 (9%)	11 (12.4%)
Active smoker	7 (6.3%)	4 (4.5%)
Previous cancer treatment		
Chemotherapy	35 (32%)	21 (23.6%)
Radiotherapy	5 (4.5%)	4 (4.5%)
Hormonotherapy	1 (0.9%)	2 (2.2%)
Body Mass Index (kg/m²)		
Below 18.5	2 (1.8%)	3 (3.4%)
18.5 – 24.9	39 (35.1%)	23 (25.4%)
25.0 – 29.9	48 (43.2%)	45 (50.6%)
30.0 and above	22 (20%)	15 (17%)
Missing	0 (0%)	3 (3.4%)

Concerning the DIVA risk assessment conducted by the ward nurses for both group participants, there were no statistically significant differences found between groups using both the ENAV ($\chi^2(4) = 4.81, p = 0.31$) and the A-DM scale ($\chi^2(2) = 0.83, p = 0.66$).

However, through the scoring of the A-DM scale, our findings suggest that 31.5% of the older adults are at moderate risk of DIVA, while 3.4% were scored as high risk. Similar findings were found through the scoring of the ENAV, with 27% of the older adults categorized between Grades III (moderate) and V (high risk), which indicates a higher chance of post-catheterization adverse events. Data on PIVC insertion and care outcomes are presented in Table 2.

Table 2. PIVC-related variables ($n = 200$).

Variables	Groups		Differences
	Adults ($n = 111$)	Older adults ($n = 89$)	
First-attempt success			
Yes	91 (82%)	62 (69.7%)	$\chi^2(1) = 4.17, p = .046$
No	20 (18%)	27 (30.3%)	
Number of consecutive puncture attempts	1.2 \pm .58 (1–4)	1.6 \pm 1.2 (1–8)	$t(198) = -2.67, p = .008$
Time until successful PIVC insertion (minutes)	8.1 \pm 5.3 (3–26)	10.5 \pm 9.2 (3–55)	$t(198) = -2.34, p = .02$
PIVC calibre			
18G	8 (7.2%)	7 (7.9%)	$\chi^2(2) = .57, p = .75$
20G	86 (77.5%)	65 (73%)	
22G	17 (15.3%)	17 (19.1%)	
PIVC location			
Metacarpal veins	59 (53.2%)	49 (55.1%)	$\chi^2(3) = 2.76, p = .43$
Forearm	44 (39.6%)	38 (42.7%)	
Cubital Fossa	7 (6.3%)	2 (2.2%)	
Lower limb (foot)	1 (0.9%)	0 (0%)	
Nurse-reported ease of catheterization	2.3 \pm 1.8 (1–7)	2.6 \pm 2.0 (1–7)	$t(198) = -1.26, p = .21$
Patient involvement after PIVC insertion			
Yes	89 (80.2%)	53 (59.6%)	$\chi^2(1) = 10.21, p = .002$
No	22 (19.8%)	36 (40.4%)	
Intravenous therapy			
Low endothelial risk	111 (100%)	89 (100%)	– $\chi^2(1) = 1.23, p = .41$ $\chi^2(1) = .985, p = .387$
Moderate endothelial risk	109 (98.2%)	85 (95.5%)	
High endothelial risk	90 (81.1%)	67 (75.3%)	

Major post-catheterization adverse events were observed due to phlebitis, infiltration, and accidental catheter removal, with rates higher in the older adults' cohort (23.6%) than in the adults' cohort (13.5%). Findings were not deemed statistically significant ($\chi^2(1) = 3.402, p = .095$).

4 Discussion

Despite its ubiquity across clinical settings and patient cohorts, previous studies have shown that PIVC insertion is difficult in 8% to 26% of the adult population, requiring two or more attempts until a peripheral vein is successfully catheterized [12, 19]. Difficulty in obtaining peripheral venous leads to increased waste of clinical materials with each attempt, the additional workload for healthcare professionals and treatment delays with impact on discharge periods [7–12]. Multiple puncture attempts lead to vascular trauma and a higher risk of immediate adverse events. Over time, this phenomenon can result in gradual venous depletion and the need to select central venous access, with more severe risks for patients and economical costs.

In this study, while the first-attempt rates found in the younger adult group converge with previous literature (82%), our findings suggest that older adults with cancer disease are more likely to experience first-attempt failure (30.3%). Similarly, we found that older adults are likely to experience two or more consecutive puncture attempts ($t(198) = -2.67, p = .008$), and the number of required attempts is also statistically significantly higher compared to younger adult patients (eight versus four attempts). These findings support the importance of formally introducing DIVA assessment as an integral part of nursing care to patients who require infusion therapy and venous access insertion, using standardized instruments and shared clinical terminology. Albeit the ENAV and A-DM scales are already validated for the Portuguese adult population [17, 18], only a small number of settings have started introducing these instruments as part of their formal patient assessment and nursing care plan. In Portugal, the lack of a standard of care for PIVC insertion and maintenance, contrary to the existing bundle for central venous access devices, may partially explain the divergent clinical practices reported in the literature [20–23].

While gauge selection and the anatomical location of the vein did not differ significantly between groups, nurses spent more time trying to successfully insert a PIVC in older adults ($t(198) = -2.34, p = .02$), to a maximum of 55 min (compared to the 26 min spent with younger adult patients). Given that one in every three older adults was at moderate to high risk of DIVA, according to the nurses' initial assessment, our findings suggest that although adults and older adults showed similar risk scores to younger adults, ageing-related phenotypic changes in skin and vessel integrity significantly compromise the locating of a suitable vein.

In this study, as in most clinical settings, nurses selected a peripheral vein using the landmark technique, which involves the application of a tourniquet proximal to the insertion site, to promote venous distension, followed by the observation and palpation of near structures [24–27]. In the absence of a visible, palpable vein, knowledge of local anatomy is important. However, this practice may be unsafe given the known variation in the distribution of veins [9].

Multiple international vascular access experts and societies highlighted the importance of using vein-detecting technologies during the assessment of the patient's veins [28–35]. Most literature converges on the importance of ultrasound-guided PIVC insertion in DIVA patients, often considered the gold standard practice. Ultrasound imaging allows the healthcare professional to locate a suitable vein, assess its size and select the proper catheter calibre, as well as continuously monitor needle progression through the skin layers until vein penetration is achieved [32–34]. While ultrasonography can be used in any anatomical region, it is an essential tool for veins above the antecubital fossa. While various studies have shown the positive implications of such technology (e.g., increase in first-attempt success rate and patient satisfaction), one of the main limitations addressed by international authors is the significant number of training hours required to achieve proficiency [30, 31].

Another promising vein-locating technology is near-infrared light (NIR). These devices allow for illuminating the vein with NIR light, which is absorbed by blood and reflected by contiguous tissue [30, 34, 36]. NIR technology allows healthcare professionals to see significant veins up to 10 mm deep and blood patterns up to 15mm deep, monitoring needle insertion and blood refill/vein flushing in real time. Previous studies have shown that NIR technology can improve first-attempt success rates, reduce post-insertion adverse events (e.g., hematoma development), and improve patients' care experience [30, 34, 36]. However, given the anatomical and phenotypic difference between age cohorts, as well as the mechanics of NIR technology, this technological aid is often used in pediatric settings, while still understudied and used in clinical settings with geriatric populations.

Likewise, locating a vein *per se* is not a synonym for first-attempt success. Several studies have shown that the vein diameter is a predictor of easiness and first-attempt success in PIVC insertion [32, 37, 38]. Recent technology aims to apply the principles of electric stimulation treatment in peripheral veins before vein selection. Through the bypass of a low-intensity electrical current between two electrodes placed on the patient's bicep and palm, this technology aims to increase the size and decrease the stiffness of target vessels [39, 40]. One study found that such technology dilated forearm veins more effectively and for a longer period than traditional heat application [39]. Another study showed that electrical stimulation in combination with a standard tourniquet increased first-attempt success in adults and older adults with moderate risk of DIVA [40]. While promising, such technology is still underused and further studies are needed to support its effectiveness in cohorts vulnerable to iatrogenic vessel trauma (e.g., cancer patients).

Finally, although not statistically significant, post-insertion adverse events were more often observed in older adult patients (23.6%) compared to younger adult patients (13.5%). These findings support previous claims that multiple punctures attempts damage vessel integrity and lead to higher rates of adverse events such as phlebitis and infiltration. However, we found that nurses were less likely to involve older patients in PIVC-related care ($\chi^2(1) = 10.21, p = .002$), with less time dedicated to explaining the reason behind the device insertion, the importance of monitoring and reporting early signs and symptoms of adverse events (e.g., pain, local redness and swelling) to the nursing team, and precautions with the PIVC during the fulfilment of their daily activities (e.g., showering, undressing) to prevent accidental removals of catheter dislodgment.

To address this gap, local care models and workflows require change, and nurses would need to get more training to help them gain the skills necessary to encourage older adult patients to participate more actively in PIVC-related care.

4.1 Limitations

Our study has certain limitations that need to be taken into consideration. Firstly, selection bias is a possibility, and the retrospective nature of the study may impact the reliability of our results. Additionally, the study was conducted in a single ward, with a limited sample size and heterogeneity, which may prevent generalization of our findings to other patient populations. Moreover, while we used standardized tools for DIVA assessment, we did not perform ultrasound measurement of patients' veins, which may impact the discussion on the effects of antineoplastic therapy and age-related phenotypic changes in vascular integrity. Finally, patient-reported outcomes such as satisfaction were not collected, which limits the comprehensive understanding of older adults' experiences with PIVC-related care, as compared to the perceptions of younger adults.

5 Conclusions

Though our secondary analysis has shed some light on the burden of DIVA in older adults with cancer disease who require peripheral catheterization, future research is warranted to properly analyze the clinical and economic impact of this phenomenon. This study reinforces the importance of formally introducing *a priori* DIVA assessment in such vulnerable cohorts, as well as vein-locating technology when no observable or palpable vein is located, to reduce iatrogenic vessel harm in older adults.

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Efficacy of Cognitive Restructuring in People with Depressive Symptoms: A Scoping Review Protocol

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Abstract. Background. Depression is a common mental disorder and affects people of all ages, from young people to older adults. The impact that depression has on people and society justifies the continuous search for strategies to reduce its incidence. Cognitive restructuring is a possible intervention for people with depression and is already defined as an intervention in the Nursing Interventions Classification, but the corresponding activities need to be properly structured. The aim of this Scoping Review will be to explore the literature to map the structure, content, and outcomes of cognitive restructuring and provide an overview of the efficacy of this intervention in people with depressive symptoms.

Methods. This is a scoping review protocol. It will follow the Joanna Briggs Institute (JBI) scoping review guidelines. We will search the following databases: MEDLINE with full text; CINAHL plus with full text; Psychology and Behavioral Sciences Collection; Academic Search Complete; SPORTDiscus with full text; RCAAAP; ARROW; Australian National University-open research; OpenGrey. The term “cognitive restructuring” does not appear as an exact term in the DeSC or MeSH descriptors, but it is a relevant term for our research. Thus, we will include this term allowing for a more precise search for information when the search is conducted in the grey literature.

Conclusion. It is anticipated that this review will map the structure, content, results and the efficacy of cognitive restructuring in people with depressive symptoms. The findings may be useful for future research and appropriate health policy making.

Keywords: Cognitive Restructuring · Depression · Depressive Symptoms · Nursing · Cognitive Behavioral Therapy · Adults · Older Adults

1 Introduction

Depression affects a high number of people in the world [1] and affects people from young to older adults [2]. In 2015 was estimated that 4.4% of the global population have depression. Prevalence rates vary by age, peaking in older adulthood, above 7.5% among females aged 55–74 years, and above 5.5% among males. Depression also occurs in children and adolescents below the age of 15 years, but at a lower level than older age groups [3]. The total estimated number of people living with depression increased by 18.4% between 2005 and 2015 [4].

With the problems that affects mental health caused by the consequences of the pandemic, the numbers of depression tend to get worse [5, 6]. And in some contexts, of greater isolation and in older adults, there is a need for special attention to the emergence of mental disorders, such as depression, which are aggravated by the pandemic by COVID-19 [7, 8].

Depression can lead to lost work productivity and increased morbidity and mortality due to direct effects associated with increased risk of suicide, reduced functional behaviours, and interpersonal functioning. It also leads to added consequences due to indirect effects on health through the exacerbation of other major causes of morbidity and mortality [3, 9, 10]. Current evidence indicates that depression has a growing trend associated with high levels of disability and other complications in various dimensions, such as social, economic, or family [5, 6].

Depression is a disease, characterised by a set of well-classified symptoms distinct from certain non-pathological feelings of sadness [3].

Given the impact of depression on people and society, it is understood that it is necessary to continue to adopt valid strategies to reduce the incidence of this disease in the population.

The cognitive model of depression is one of the main theories on the onset of this pathology and is based on the theory that the disease is characterised by the onset of automatic negative thoughts and distorted interpretations of reality, leading to specific emotions and behaviours, which are common in depression. It assumes that thoughts, emotions and behaviours are always interconnected [11, 12]. This model also relies on a dynamic mental feedback process such that negative affect increases the likelihood of further negative thoughts, and also reinforces negative beliefs and schemas [11].

Based on the cognitive model of depression, Cognitive-Behavioral Therapy (CBT) in the treatment of depression seeks to modify the inappropriate behaviours associated with depression by analysing and intervening on thoughts [13, 14].

There are some CBT techniques, such as Metacognitive Training [15–17] or Cognitive Restructuring [18, 19] that aims to lead the person to question the validity of their distorted thoughts and beliefs, aiming to identify them and replace them with more realistic and positive interpretations [18, 19].

The main objective of CR is to reduce the psychological suffering of the person, through analysis, interpretation and modification of the thoughts that contribute to the presentation of depressive symptoms [20].

CR is already defined as a defined intervention in the Nursing Interventions Classification (NIC) [21]. But, although a set of corresponding activities are defined, they are not properly structured.

Thus, for the above reasons, we consider it relevant to conduct detailed research on the application of CR in people with depression so as to analyse the contents used and the procedures used in the application of this therapy as a specialised intervention in Mental Health Nursing. For this purpose, a scoping review (ScR) will be conducted on the CR applied to people with depressive symptoms. The ScR proposed and planned through the protocol will follow the methodology recommended by the Joanna Briggs Institute (JBI) [22] which developed the previous work of which developed previous work by several authors [23–25].

2 Methods

The ScR approach is designed to synthesise the relevance of the evidence by mapping the existing knowledge in a given area, seeking to know it in detail [25]. This methodology prioritises the relevance of the evidence mapped and does not aim to analyse the quality of the nature of that evidence [22, 24, 25].

ScR is an important tool for analysing a vast volume of available data, providing in-depth knowledge of the evidence found, in the most diverse forms. It allows for a detailed analysis of contents on a given area, as well as it is a preliminary methodology for the possibility/need to carry out a systematic literature review [26, 27].

For the review of the theme proposed by us, ScR was considered the most appropriate methodology, as it is projected to enable an inclusive, vast and in-depth research of the content/results of the theme under study: cognitive restructuring.

The possibility of including the research in the *grey literature* will allow increasing the knowledge and understanding of the existing information on CR. At this starting point in our work, our main interest focuses on mapping the content and structure of the topic under study.

With the present protocol we intend to present the plan for our ScR. The changes to this plan shall be duly explained in the final report of the ScR, which shall contain explicit reference to the present protocol [22]. To disseminate the study and avoid duplication, this protocol was registered in the Open Science Framework (registration: [doi.org/https://doi.org/10.17605/OSF.IO/4P39T](https://doi.org/10.17605/OSF.IO/4P39T)).

This work is being developed in the context of the PhD programme in Nursing and Health at the University of Rovira i Virgili in Tarragona – Spain.

The researchers also declare that there was no financial support for this study, nor any conflict of interest.

2.1 Title of the Scoping Review Protocol

Following the JBI guidelines for drafting titles for an ScR, with the suggested “PCC” strategy – Participants, Concept, Context [22, 28], the definition of a precise title for the intended RSS was sought. However, focusing on the objectives of the study, after the discussion with the work’s supervisors and other experts in the area, it was decided to maintain an extended search for the data to be obtained regarding the context, so as to better understand and map the existing information on the topic. To achieve the guidelines outlined, the following title was defined:

Efficacy of Cognitive Restructuring in people with depressive symptoms, a Scoping Review protocol.

2.2 Aims of the Scoping Review

The main objectives of this study are as follows:

- To map the structure of cognitive restructuring as an intervention;
- To map the contents addressed in cognitive restructuring;
- To analyse the results obtained with the application of cognitive restructuring.

The mapping of the topic under study proved to be relevant since no reviews or review protocols (published or to be conducted) were found with the aim of mapping the structure and content of CR. A previous consultation was made in the JBI databases (Database of Systematic Reviews and Implementation Reports), Cochrane Library, Prospero (International Prospective Register of Systematic Reviews), MEDLINE (Medical Literature Analysis and Retrieval System Online), CINAHL (Cumulative Index to Nursing and Allied Health Literature) e OSF (Open Science Framework), as the information found was very disperse and fragmented, it was considered beneficial to analyse and compile evidence in this area. Evidence synthesis, in the form of a literature review, is at the heart of evidence-based practice [27, 29].

2.3 Guiding Questions of the Study

Considering the above objectives for the present study, the following research questions were created:

- What are the characteristics of cognitive restructuring, used in people with depressive symptoms?
- What are the results of using cognitive restructuring in people with depressive symptoms?

2.4 Inclusion Criteria

The criterion established is the inclusion of studies on CR that answer the questions of the study, seeking to map its characteristics in its genesis, with a focus on structure and content. Thus, primary and secondary studies, published and unpublished, will be accepted on the topic to be researched, within a time window of 10 years, between 2010 and 2020, in order to obtain the most recent and ample evidence on this topic.

The languages defined as criteria were English, Portuguese and Spanish, for the vast information that allows mapping and for the mastery of them by the reviewers of the study, relevant to the quality of the ScR.

It was intended to exclude interventions involving children due to the specificity of interventions in this age group. It was decided not to exclude the adolescent age group due to the fact that some interventions used in adults and adolescents are similar, in their original or adapted form. By adolescent we mean a person aged between 13 and 18 years, by adult we mean a person aged over 18 years [30].

2.5 Research Strategy

To minimize bias in the results of the ScR, the screening and data extraction process will be carried out by two independent reviewers, with the supervision of the study supervisors.

The research is intended to cover primary and secondary studies, of the most diverse methodologies, using the following databases: MEDLINE with full text; CINAHL plus with full text; Psychology and Behavioral Sciences Collection; Academic Search Complete; SPORTDiscus with full text; RCAAP; ARROW; Australian National University-open research; OpenGrey.

In a last step, the bibliographic reference lists of all included articles will be analysed in order to identify possible additional relevant studies. All duplicate articles will be excluded.

With support from the selected databases, the key words were determined based on the DeCS (Descriptors in Health Sciences) controlled vocabulary terms, developed from the MeSH (Medical Subject Heading), which will best translate the focus of the investigation, with the aim of allowing a consistent means of searching for the information [30]. The following terms were identified: “cognitive therapy”; “depression”; “depressive symptoms”; “cognitive restructuring”.

The term “cognitive restructuring” does not appear as an exact term in the DeSC or MeSH descriptors, but it is, nevertheless, a relevant term for our search. Thus, it was considered relevant by the researchers to include this term, enabling a more precise search for information when searching the *grey literature*. We also agree that the inclusion of this term in the *Boolean phrase* will not limit the search in scientific databases due to the way it is built.

In the databases, the search will be carried out with the following *Boolean phrase*, from the crossing of the key terms: (“cognitive restructuring” OR “cognitive therapy”) AND (“depression” OR “depressive symptoms”) NOT “child”.

A particularly important point is that ScR can draw on data from any type of evidence and research methodology and is not restricted only to quantitative studies (or any other study design) [22].

The preparation of this protocol took place during 2020 and its registration took place in 2020, and the research, selection, extraction and mapping of the data obtained will take place between November 2020 and April 2021.

2.6 Selection and Extraction of Results

Data selection and extraction will be performed by the two reviewers using two instruments developed by them [Table 1 – Instrument for the selection of the information obtained in the research; and Table 2 – Information Extraction Instrument (*adapted from* [22])], based on the model instrument presented by the JBI for extraction of details, characteristics and outcomes [19, pp.27]. These instruments were also developed based on the objectives of the review.

The two reviewers, independently, will read the title and abstract, according to the previously established search and inclusion criteria. The analysis of the articles in full text will include all articles that meet the selected criteria described in this protocol and

also for articles that may have doubts as to their relevance to the theme, after reading the title and abstract.

Only papers in which both reviewers agree on their research interest will be included in the ScR. In case of need, e.g. disagreement between reviewers, we will resort to discussion with the ScR advisors. When indicated, information will be collected from the authors of the papers.

The lists of references of the selected articles will be analysed, first by their title, followed by the analysis of the abstract of the articles considered relevant and then by the analysis of the full text. Additional relevant articles, which are not duplicated and meet the search/ inclusion criteria, will be included in the ScR.

To list the information resulting from the survey, the following analysis and classification tool was developed.

Table 1. Instrument for the selection of the information obtained in the research

Selection of the information obtained											
Title	Seriation									Comments	
	Title			Abstract			Full text				
	1	2	3	1	2	3	1	2	3		

1 – Reviewer seriation nº1; 2 – Reviewer seriation nº2; 3 – Final/Joint seriation (reviewers nº1 e nº2);
A – Accept; E – Excluded;

It should be noted that there will be no assessment of the quality of the information regarding its scientific evidence, to obtain as much data as possible to map.

2.7 Presentation of Results

The PRISMA-ScR (Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews) guidelines [28] will be followed to report the process performed. The results will be presented in a research article for scientific publication, seeking to disseminate the mapping performed.

Table 2. Information Extraction Instrument (*adapted from [22]*)

Extraction of Results		
Information on the study	1. Title	Indicate full title and subtitle.
	2. Authors	Indicate all authors (last name and first name abbreviated).
	3. Origin (Country)	Reference to the country where the study was carried out.
	4. Study Type	Indicate method used and study design.
	5. Research aim/purpose	Describe the aim/purpose/reasons for the research.
	6. Publication Year	Year of publication of information.
	7. Comments	Other relevant aspects to mention.
Information on the intervention	8. Intervention Name	Describe full name and abbreviations used.
	9. Target group of the intervention	Age, sex, number and inclusion/exclusion criteria, other relevant characteristics.
	10. Intervention focus	Describe the area of intervention, main focus/reasons for application on participants.
	11. Context of the intervention	Indicate the context/environment where the intervention was applied.
	12. Intervention Structure	Mention the frequency and duration of the sessions, among other structuring aspects.
	13. Intervention methodologies	Identify the methods and techniques/strategies used.
	14. Intervention content/actions	Identify the main contents/themes used.
	15. Assessment instruments used	Describe assessment instruments used and relevant to the implementation of the intervention.
	16. Results of the study	To identify the concrete results obtained from the implementation of the intervention in the participants.
	17. Therapists involved and competences	Refer to the number of therapists, their connection to the intervention, qualifications and other relevant characteristics.
	18. Limitations and difficulties	Describe difficulties and constraints in the implementation of the intervention.
19. Comments	Other relevant aspects to mention.	
Other information	20. Study citation	APA Standards 7th ed.
	21. Other relevant studies	Bibliographic reference of papers accepted after analysis of the title, abstract and full text.
	22. Comments	Other relevant aspects to mention.

3 Conclusion

It is anticipated that this review will map the structure, content, results and the efficacy of cognitive restructuring in people with depressive symptoms. The findings may be useful for future research and appropriate health policy making.








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The Patient Undergoing Total Hip Prosthesis – Effectiveness of Applying a Rehabilitation Program During the Preoperative Period

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Abstract. Coxarthrosis determines a loss of functionality and autonomy in people with this problem. The placement of total hip prosthesis is one of the frequent treatments. Rehabilitation nursing is crucial for the rehabilitation of these patients. **Objective:** to analyse the effectiveness of a rehabilitation nursing programme, during the preoperative period, in patients undergoing total hip replacement. **Methodology:** a nursing rehabilitation programme was implemented, pre and postoperatively, with eight patients undergoing total hip replacement, having adopted the multiple case study methodology. **Results:** The implementation of a preoperative rehabilitation nursing programme contributed to the recovery of the study participants, as reflected in pain relief, improved muscle strength, range of motion of the intervened joint, balance, and reduced risk of falls and functional capacity. **Conclusion:** the implementation of rehabilitation nursing intervention strategies promoted the autonomy of these patients, their functional independence, and their reintegration into the community.

Keywords: Effectiveness · Nursing · Preoperative · Total hip prosthesis · Rehabilitation

1 Introduction

According to the National Institute of Statistics (NIS), Portugal maintained the trend of demographic aging between 2015 and 2020, with an increase from 20.7% to 22.4% of

elderly people (people aged 65 years or over). As such, the aging index has changed from 145,5 to 167 seniors for every 100 young people. This is due to increased longevity, reduced birth rates and negative migration balances [1].

Aging is a process influenced by various factors, whether physiological, sociological, or psychological. This stage of life is followed by several changes, namely the decrease in functional capacity, with possible occurrence of loss of autonomy and independence of the person [2].

In Portugal, approximately 1.3% of the population suffers from coxarthrosis [3]. This is one of the main causes leading to the realization of total hip replacement (THR). It is a surgery that aims to replace the damaged part of the hip joint. It is one of the most performed surgeries in the world, aimed at reducing pain, improving the patient's mobility and functionality and, consequently, allowing for an improvement in their quality of life [9, 10, 19].

Some studies point to the persistence of pain, deficit of the amplitude of movement and strength, as well as functional limitations, explicitly in terms of walking and balance, during the first postoperative year. Other studies have found that there may be a decrease in muscle strength at the level of the hip during the first years after the surgery, which may influence balance, both static and dynamic, increasing the risk of falling and compromising the person's interaction with their environment and their ability to perform activities of daily living (ADL's) [4, 5].

As such, it is fundamental the intervention of specialist nurse in rehabilitation nursing (SNRN) as a fundamental element in the recovery process of these patients, given that it is their function to create, implement and monitor rehabilitation nursing programs, directed to the needs and expectations of the person, promoting health, and preventing complications [6].

People with a worse preoperative condition obtain worse results in the postoperative period, when compared to people with a better physical condition at the time of the preoperative period [7].

Considering the techniques and exercises to be carried out in the preoperative period of THR placement, the following stand out: functional assessment and determination of the rehabilitation potential; capacity of patient and family, with regard to the objectives and the importance of the rehabilitation program, as well as, with regard to the technical assistance they will require after surgery; assessment of respiratory function, with performance of respiratory functional reeducation exercises (RFRE); and, also, performance of motor functional reeducation exercises (MFRE) – isometric and isotonic exercises [8]. Pain control should also be a focus of attention during the preoperative period [7].

Education in this phase has, as main objectives: preventing dislocation, getting up, lying down, sitting down, going up and down stairs and using walking aids [9].

During the first 48 postoperative hours, there is a set of precautions to be adopted, namely in terms of avoiding potentially dislocating movements [5], about which the person must be instructed, even during the preoperative period.

It is important to properly understand the implications of the surgery and what to expect in the postoperative period, to reduce anxiety [7, 10].

In the immediate period after surgery, attention should be paid to preventing the adoption of potentially dislocating positions [5]. The rehabilitation program will allow

the recovery of functionality more quickly, as well as the readaptation of the person to ADL's [11], allowing a reduction in the period of hospitalization.

Postoperative pain control should be one of the focuses of the nursing team, given that uncontrolled pain can increase the person's reluctance to adhere to the rehabilitation process, increasing the length of hospitalization, as well as costs associated [12].

In the postoperative period should, also, be reinforced the education sessions given in the preoperative period, both to the person, and their family.

The SNRN must develop rehabilitation programs, based on the person's interests and expectations, with the aim of promoting motor and ADL's training. The early institution of a RE program will promote the person's autonomy, functional independence, and quality of life after THR placement.

In this sense, the central objective of the study conducted is to analyze the effectiveness of a rehabilitation nursing program, during the preoperative period, in patients undergoing THR. Implicit to it, we considered it important to compare the results obtained between individuals aged <65 years (group A) and those aged ≥65 years (group B).

2 Methodology

A descriptive approach was adopted, motivated by the need to better understand the phenomenon under study and contribute to the development of knowledge in specialized intervention in rehabilitation nursing. The sample was selected based on the previously defined eligibility criteria and on the period defined for the implementation of the intervention project (Table 1). A non-probabilistic, accidental sample of 8 people with this problem was chosen.

The instruments used to control and assess the intervention program in rehabilitation nursing are also presented in Table 1.

Table 1. Applied methodology

Target population	Patients hospitalized for THR, conscious, oriented and interested in joining the rehabilitation program
Inclusion criteria	<ul style="list-style-type: none"> – Age ≥ 55 years – Patients who are aware, oriented and interested in joining the rehabilitation program – Patients whose family was receptive in the rehabilitation program, with a view to returning home
Exclusion criteria	<ul style="list-style-type: none"> – Age < 55 years – Patients with impaired cognition; – Patients whose family was not available to participate in the rehabilitation program
Timeline	– During the 10-week internship at the Orthopedics inpatient service

(continued)

Table 1. (continued)

Target population	Patients hospitalized for THR, conscious, oriented and interested in joining the rehabilitation program
Assessment instruments used	<ul style="list-style-type: none"> – Medical Research Council (MRC) scale for assessing muscle strength; – Assessment of joint amplitude with the goniometer; – Barthel index for assessing activities of daily living; – Numeric scale for pain assessment; – Morse scale to assess the risk of falling; – Simple assessment of body balance

2.1 Strategies Developed

In the implementation strategies of the rehabilitation nursing program, we defined three key moments for assessment and control, using the pre-defined instruments: on the 1st day of hospitalization, on the 1st postoperative day and on the 4th postoperative day and/or at hospital discharge.

The strategies developed are presented in Tables 2 and 3, in line with the model followed by Carvalho & Sousa [8].

Table 2. Strategies implemented during preoperative period

Assessment of the patient and his objectives, as well as his socio-family context, in close cooperation with the family;
Training of the patient and family regarding the rehabilitation program;
Assessment of joint amplitude;
Teaching and training for the postoperative period regarding: <ul style="list-style-type: none"> - Prevention of potentially dislocating movements; - Technique of carrying out transfers, in a safe way; - Gait training with auxiliary devices; - Training to go up and down stairs.
RFRE exercises (3 sets of 10 repetitions, according to tolerance): <ul style="list-style-type: none"> - Breathing awareness; - Abdominal-diaphragmatic exercises; - Exercises for costal re-education, including the use of a stick; - Cough teaching.
MFRE exercises (3 series of 10 repetitions, according to tolerance): <ul style="list-style-type: none"> - Isometric exercises: <ul style="list-style-type: none"> * Abdominal isometric contractions; * Isometric contractions of the glutes; * Isometric quadriceps contractions; * Isometric contractions of the sural triceps. - Isotonic exercises <ul style="list-style-type: none"> * Free/assisted/resisted active mobilizations of healthy members; * Dorsiflexion/plantar flexion of the tibiotarsal.

Table 3. Strategies implemented during postoperative period

Assessment of the patient and the perception of his health status;
Assessment of joint amplitude;
RFRE exercises (3 sets of 10 repetitions, according to tolerance): - Breathing awareness; - Abdominal-diaphragmatic exercises; - Back re-education exercises, including the use of a stick; - Cough teaching.
Validation and reinforcement of knowledge regarding the prevention of potentially dislocating movements;
MFRE exercises (3 series of 10 repetitions, according to tolerance): - Isometric exercises: *Abdominal isometric contractions; * Isometric contractions of the glutes; * Isometric quadriceps contractions; * Isometric contractions of the sural triceps. - Isotonic exercises: *Mobilizations in bed and standing (free/assisted/resisted active of the intervened limb, according to tolerance): - Flexion/extension of the coxofemoral joint and the knee; - Adduction to the midline and abduction of the hip; - Dorsiflexion and plantar flexion of the tibiotarsus. *Strength and resistance training, using elastic bands and weights.
Transfer training;
Balance training;
Gait training with auxiliary devices;
Training to go up and down stairs;
ADL's training.

To conduct this study, we considered several ethical aspects. The opinion of the Ethics Committee of the institution involved, an institution in the Southern Region of Portugal, was requested and authorized by Order 154/2021 of 18/06/2021. The persons involved in the study were previously informed and clarified about the content, objectives and interventions of the intervention project in which their inclusion was proposed. They were ensured the confidentiality of the data collected and the right to withdraw from the project at any time and to fully ensure their informed consent to participate in the project, they signed a declaration of informed consent.

3 Results

Table 4 summarizes the socio-demographic characteristics of the participants in the study.

Table 4. Sociodemographic assessment of participants

	< 65 years (Group A)		≥ 65 years (group B)	
	Number	%	Number	%
Male	3	100%	1	20%
Female	0	–	4	80%
Married	2	67%	5	100%
Divorced	1	33%	0	–
Lives with family	2	67%	5	100%
Resides alone	1	33%	0	–
Compulsory education	2	67%	4	80%
University education	1	33%	1	20%
Employee	3	100%	0	–
Retired	0	–	5	100%
Lives in a single storey house	2	67%	2	40%
Lives in apartment with elevator or ground floor	1	33%	3	60%

3.1 Barthel Index Assessment

When applying the Barthel Index, we found that, on the first day of hospitalization, 2 of the participants (67%) were independent between group A and 2 (40%) between group B. On the postoperative day, only 1 user (33%) was independent in group A and no one in group B. Between the 1st postoperative day and the 4th day there was a reduction in the percentage of dependency: on the 1st day 100% of group A was dependent on the 4th day 2 users (67%) were moderately dependent and 1 (33%) independent. In group B, of 4 users (80%) with severe dependence and 1 (20%) with moderate dependence, we now have, on the 4th postoperative day, 1 (20%) with moderate dependence and 4 (80%) with very light dependency.

3.2 Assessment of the Strength of the Intervened Limb Using the MRC Scale

With regard to the evaluation of the muscle strength of the operated limb, using the MRC scale, we can see that, in relation to the preoperative period, in group A, only 1 user (33%) showed improvement in terms of the knee joint on the 4th postoperative day, with the others remaining with aggravation or without alteration. In group B, on the 4th postoperative day, 1 user (20%) showed improvement at the level of the coxofemoral joint and 2 (40%) at the level of the knee joint, compared to the preoperative period.

3.3 Pain Assessment

In terms of pain assessment, among group A, all showed improvement, both on the 1st postoperative day and on the 4th day. In group B, 3 of the users (60%) presented worsening

on the 1st day, while 2 (40%) showed improvement, and on the 4th postoperative day, 1 (20%) reported not feeling any improvement compared to the preoperative period and 4 (80%) felt a decrease in pain.

3.4 Fall Risk Assessment

When evaluating the risk of falling, we found that there was a general tendency towards worsening on the 1st postoperative day, in both groups, with only 1 user (33%) showing improvement. On the 4th postoperative day, among group A, 3 (67%) reported worsening and 1 (33%) had no changes. Among group B, 1 (20%) presented worsening, against 4 (80%) without change, on the 4th day.

3.5 Assessment of Joint Range of Motion of the Affected Hip Joint

In terms of assessing the range of motion of the operated hip joint, on the 1st postoperative day, we found that, in the flexion movement, among group A, 2 users (67%) showed improvement and 1 (33%) worsened, and among group B, 2 (40%) showed improvement, with 3 (60%) showing worsening. In the remaining movements, there was a tendency towards worsening, both in group A and in group B.

On the 4th postoperative day, it was found that, in group A, there were 2 users (67%) with improvement in terms of flexion, with 1 (33%) of the participants showing improvement in terms of abduction. In group B, on the 4th postoperative day, there were 2 users (40%) with improvement in flexion, compared to the preoperative period, and also 3 (60%) with improvement in terms of extension, 4 (80%) with progress in adduction and also 1 (20%) with improvement in abduction movement.

3.6 Balance Assessment

Regarding the assessment of balance, on the 1st postoperative day, in group A, 1 of the users (33%) presented worsening of static balance while standing and 2 (67%) presented impairment of their dynamic balance while standing. On the 4th postoperative day, all the elements of group A had their balance maintained, as at the time of discharge. Among group B, on the 1st day of hospitalization, 2 (40%) presented alterations in static standing balance and all participants saw their dynamic standing balance compromised. On the 4th postoperative day, only 1 of the participants (20%) had impairment of their dynamic standing balance.

4 Discussion

In the results obtained, we can see that in group A, 100% of the participants are male, while in group B, 4 (80%) are female. As mentioned, group A is composed of participants aged < 65 years and group B by those aged ≥ 65 years.

The fact that, in group B, 80% of the participants were female, goes against the existing knowledge that osteoarticular degeneration is more frequent in women than in men aged ≥ 65 years [13, 14], leading to the need for hip joint replacement. Fernandes &

Martins [15] also found, in their study, that the female sex was predominant in relation to the male sex, about the need for THR. The fact that in the group aged < 65 years, all participants are male, is not justified in the light of the literature, and may be due to a number of different factors, such as repeated use of the joint, incorrect postures, anatomical alterations or genetics [13]. Factors such as obesity, previous joint damage or other bone diseases were excluded during the initial assessment of the 3 participants. An aspect common to both participants, from group A, is related to the fact that they exercise professions that require spending a lot of time standing, which can contribute to the wear and tear of the hip joint. Given that, statistically, this is a small group, it would be necessary to promote a broader study, in order to deepen and monitor the participants, so that the existence of a relationship between sex, age and professional activity could be verified.

Among the members of both groups, only one reported living alone, so he was instructed on the importance of arranging for aid support when returning home. All other participants lived with family members capable of providing assistance.

In group A, 1 (33%) of the participants attended higher education, while in group B, only 1 (20%) exceeded their training beyond compulsory education.

Regarding the employment situation, in group A all participants are active, on the other hand, in group B all are retired. This is justified by age, given that in Portugal the retirement age is 66 years and 7 months [16]. This factor made the two groups differ in terms of expectations after discharge, given that in group A all the participants reported that their main desire was to go back to work, while in group B, the main expectation was to stop having pain and being able to carry out their ADL's without difficulty.

The assessment of the type of residence was the subject of attention, given that the existence of steps to access the house or inside it could change the intensity with which the training on stairs would be focused. This is due to the fact that, if the person needed to go up and down steps every day, they would need to be prepared for this at the time of discharge. We verified, in both groups, that all participants lived in a single-story house, without the need to go up and down stairs daily, in an apartment on the ground floor or with an available elevator.

The Barthel index measures functional independence in terms of carrying out ADL's, by evaluating the capacity for: eating, bathing, personal hygiene, dressing and undressing, bowel and bladder elimination, using the toilet, transfer, walking and going up and down stairs [17]. It was found that in group A, upon admission, 2 of the users (67%) were in a situation of independence and 1 (33%) in a situation of moderate dependence, while in group B, only 2 (40%) were independent and 3 (60%) suffered from moderate dependence, which goes against the fact that advanced age is a factor that increases the predisposition to loss of independence in terms of performing ADL's [13]. After surgery, the percentage of independence, between both groups, reduced. It was found that, on the 4th postoperative day, among group A, only 1 (33%) was independent and in group B, only 2 (40%). This goes against the fact that THR causes an increased period of dependency during the early stages [18], so it is necessary that people proposed for surgery guarantee family support after hospital discharge.

The assessment of strength through the MRC scale allowed us to verify that, upon discharge, none of the participants in group A showed improvement in terms of strength

of the coxofemoral joint, and in group B, only 1 (20%) reported improvement in terms of strength in this joint. Articulation. This is in line with Matheis & Stöggel [18], who state that early rehabilitation is imperative for patients undergoing THR, although there are no studies that show the progress obtained during the first postoperative week. However, they state that it is essential to act, as early as possible, with these patients, in order to increase muscle strength and the proper functioning of the joint, so that they are able to optimize their functionality, reducing the risk of falls and increasing the safety in walking.

Muscle strength is reduced in people with coxarthrosis; however, it is even more reduced in the postoperative period, due to the influence of the pain felt and the immobility associated with hospitalization [17]. As such, it was found important to reduce the factors that influence immobility. All participants in the study gave a positive opinion regarding the RFRE and MFRE instituted preoperatively, having reported that they felt more confident and empowered to perform them during the postoperative period. In terms of performing the isometric exercises, the participants reported having performed the exercises immediately after returning from the post-anesthetic care unit, having contributed to their successful performance on the first postoperative day. This goes against the existing evidence, verified by Coladonato et al. [4], that isometric exercises performed while still in bed, increase the patient's feeling of strength, although there are no data to prove this.

Pain is a subjective experience [19], which depends on the perception of each individual. As such, its evaluation was carried out using a numerical scale, where each participant indicated the intensity of pain they felt, between the values of 0 (no pain) and 10 (maximum pain) [20]. On the first day of hospitalization, all participants reported pain ≥ 6 (moderate/severe), except for participant 1 who did not report pain. This parameter showed a generalized improvement, with greater visibility on the 4th postoperative day, in which, among group A, 100% showed improvement and, among group B, this improvement was seen in 4 of the 5 users (80%), with only 1 (20%) unchanged. The results obtained at this level corroborate the fact that pain control is one of the primary indications for THR placement surgery [12]. In the study carried out by Violante [24], regarding the effectiveness of preoperative teachings with the patient undergoing THR, it was found that there is a reduction in pain compared to the preoperative period.

On the first postoperative day, among group B, 3 of the participants (60%) presented worsening pain, which is in line with the existing knowledge that this is stronger in the immediate postoperative period, subsequently showing improvement [12]. On the other hand, among the group of younger participants (A), all reported improvement in pain on the first postoperative day, which may be due to the subjective perception of pain and/or the pharmacological strategies used.

Pain control was carried out, in coordination with the patient and the rest of the healthcare team, in order to keep it at tolerable levels for the patient, so as not to be an inhibiting factor in the rehabilitation process. With this objective, we resorted to the administration of prescribed analgesic and anti-inflammatory drugs and application of local cryotherapy.

Following the decrease in balance and muscle strength, which follows the placement of THR, there is a risk of falling. This was one of the evaluated parameters, given that

the increase in the number of falls can increase the period of hospitalization, the risk of new hospitalizations, loss of confidence, of quality of life, appearance of co-morbidities, and may, in more serious situations, lead to death [10]. As such, it was assessed using the Morse fall scale [22].

It was found that, on the first postoperative day, among group A, 2 of the participants (67%) showed a worsening of the risk of falling and 1 (33%) showed an improvement (a fact associated with one of the users not having undergone a transfer when of the 1st day); on the 4th postoperative day there were 2 (67%) with worsening compared to the preoperative period and 1 (33%) had no alteration. In group B, on the first postoperative day, 100% showed a worsening of the risk of falling, reducing to 20% (1 participant) on the 4th postoperative day, with the remaining 80% (4 participants) without change in relation to the preoperative. Such an improvement between the 1st postoperative day and the 4th day was due to the fact that the participants were subject to intravenous therapy on the 1st day, which was not verified on the 4th day, as well as, to the intervention of the SNRN, to the level of adaptation of the same to walking aids, in a safe way. In order to reduce the risk of falling, the participants were instructed regarding the importance of adopting preventive measures against falls when returning home, such as: wearing closed shoes; removal of carpets and objects that are difficult to see from the floor and avoidance of wet floors.

The assessment of joint amplitude was performed using a goniometer. Goniometry makes it possible to determine the presence of joint dysfunctions, through the assessment of joint angle limitation, allowing the comparison of reassessments with the initial assessment [23]. The evaluation of the internal and external rotation movements was not carried out, as these are movements to be avoided, as they are potentially luxating [8, 18].

It was verified, during the evaluation on the first day of hospitalization, that flexion is the joint movement most affected by coxarthrosis, when comparing the values obtained in the evaluation and the reference values for the hip joint.

On the first postoperative day, we found that, in the flexion movement, among group A, 2 participants (67%) showed improvement and 1 (33%) worsened, and among group B, only 2 (40%) showed improvement, with 3 (60%) showing aggravation. In the remaining movements, there was a tendency towards worsening, both in group A and in group B.

On the 4th postoperative day, it was found that, in group A, there were 2 participants (67%) with improvement in terms of flexion, and 1 of the participants (33%) also showed improvement in terms of abduction. In group B, on the 4th postoperative day, it was found that 2 of the participants (40%) showed improvement in flexion, compared to the preoperative period, and 3 (60%) showed improvement in terms of extension. There were also 4 (80%) with progress in terms of adduction and 1 (20%) with improvement in terms of abduction movement. Violante [24] verified, in relation to this theme, that preoperative education sessions are beneficial in increasing joint range of motion in the postoperative period, in relation to the lack of such teaching.

The presence of a smaller percentage of participants with improvement, on the first postoperative day, can be explained by the pain, more intense at this moment, which behaves as an inhibiting factor of movement, as well as by the edema of the tissues in the

postoperative period [12]. As such, once again it is essential to control pain and edema, through pharmacological measures and cryotherapy, as previously mentioned.

The muscles of the coxofemoral joint play a fundamental role in terms of postural stability, which is why, when trauma caused by the surgery to place a THR, there is a reduction in muscle strength, with a reduction in balance being expected [11]. As such, this was the focus of our attention, with a simple assessment of balance being carried out, by ascertaining the presence, or not, of static and dynamic balance, in the sitting and standing position.

Upon admission for surgery, all participants had maintained balance, both static and dynamic, in both sitting and standing positions. On the 1st postoperative day, in group A, 1 of the participants (33%) presented worsening of static balance while standing and 2 (67%) had their dynamic balance disturbed while standing. On the 4th postoperative day, all the elements of group A had their balance maintained, as at the time of discharge. With regard to group B, on the 1st day of hospitalization, 2 (40%) presented alterations in their static standing balance and all participants found their dynamic standing balance compromised. On the 4th postoperative day, only one of the participants (20%) showed impairment of their dynamic standing balance.

It is important to note that, after the THR surgery, all participants left the Orthopedics service, heading home, walking with walking aids (walkers and/or crutches). The teachings were carried out with the aim of finding the device with which the participant could walk more safely, while responding to their needs when returning home.

Amaro [25] studied the impact of preoperative training on the recovery of people undergoing THR, finding that this leads to gains in health due to the acquisition of skills and knowledge related not only to their pathology, but also to the appropriate safe positioning, mobilization, and walking techniques. Participants considered that preoperative training was relevant in their recovery process.

The division into 2 groups, A and B, did not originate results clearly different. This may be due to the reduced sample size, but also to the fact that all study participants were previously selected in an external consultation, by the medical team, being in a similar health situation, regardless of age, namely in terms of absence of comorbidities and previous functional status.

The literature is still not consistent in terms of the ideal moment to start the rehabilitation process, however, in the study carried out by Casaca-Carreira et al. [26], agreement was found on how it should be started as early as possible, namely in the first 48 postoperative hours. This is in line with what we obtained, given that when implementing this intervention project, closely studying the evolution of these 8 participants, we were able to verify that all of them gave a positive opinion regarding their inclusion in it, as mentioned above. The participants were discharged feeling more confident about their health situation and, above all, with less pain. Fernandes & Martins [16] concluded, in their study, that the participants who received preoperative teaching before the placement of THR, considered that they contributed to achieving independence during the postoperative period. These authors also found that patients who received preoperative training achieved greater independence, with a shorter hospital stay compared to those who did not. Still in this sense, we refer to the study carried out by Amaro [25], which also concluded that the participants considered the role of the SNRN in the preoperative

period of THR placement to be essential, being an added value in terms of training, achievement of goals and prevention of complications, being a key element before, after and throughout the recovery process.

However, for a true appreciation of the benefits and effectiveness of applying a preoperative rehabilitation program, it would be necessary to have a larger sample and carry out a comparative study, between participants submitted to a preoperative program and others exempt from this intervention. Monitoring the participants after hospital discharge would be beneficial to understand their evolution, namely in terms of recovering their independence and autonomy. If we think of participants of the typology of group A, it would be interesting to analyze whether or not they returned to work.

We also verified that there is a lack of studies and, consequently, little literature referring to the importance of SNRN during the preoperative period, making it important to invest in this area, in order to reinforce its role.

5 Conclusion

There is an increasing trend in the number of people requiring THR placement, so it was necessary to analyze the effectiveness of the SNRN intervention, particularly in terms of the preoperative period, assuming it as the main objective of this intervention project in rehabilitation nursing. In this sense, professional intervention strategies were implemented, with people in the preoperative period of THR placement, and their effectiveness was analyzed during the postoperative period and hospital discharge. We found that the implementation of a preoperative rehabilitation nursing program contributed to the recovery of the study participants, which was reflected in pain relief, improvement of muscle strength, range of motion of the intervened joint, balance, and reduction of the risk of falls and functional capacity.

The positive feedback from those involved regarding the performance of the SNRN, from the preoperative period and the benefit of the early start of rehabilitation in these patients has been confirmed in the literature.

Regarding the comparative analysis between individuals aged < 65 years and those aged ≥ 65 years (groups A and B), we did not observe noticeably different results. In this sense, it would be beneficial to conduct a study with a larger sample and in a wider time frame.

In view of the limitations of this study, due to the sample characteristics, it is essential to develop an experimental study to measure the effect of a rehabilitation nursing intervention program on the recovery of people with this condition in the pre- and postoperative periods.

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Health Interventions to Support Caregivers of Elderly People



Social Meanings in the Iconography of Health and Elder Care Apps

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Abstract. The process of technologization of self-care, which has become widespread in recent years, has also reached the elderly. More and more elderly users are utilizing devices such as voice assistants, wearables or smartphone apps to improve their quality of life. Due to the wide diffusion of smartphones, their functionality and low cost, health and care applications have gradually been incorporated into the daily life of the elderly, and companies are increasingly designing apps specifically aimed at this sector of the population. The aim of this paper is to study the images of the elderly used in the iconography of health and care apps in order to evaluate the nature of the relationships projected, the connotations, analogies and stereotypes that are contemplated, as well as the contexts and patterns in which they are framed. To this end, a semiotic analysis of the visual register is carried out at the iconic, iconographic, tropological, topical and enthymematic levels. The results of this analysis are contrasted with those of the main debates on aging and advertising. The conclusions expose the notable absences in terms of the construction of an inclusive image of old age and a series of recommendations are made with the aim of reversing this deficit.

Keywords: App · Healthcare · Elderly · Semiotic Analysis · Images · Aging

1 Introduction

Global population trends, with the progressive incorporation of the so-called *baby boom* generations into the over-65 age group and the sustained increase in life expectancy due to the expansion of medical advances and improvements in quality of life, present a scenario that consolidates very long-lived demographic profiles [1, 2]. This widespread ageing is particularly evident in developed societies, a dynamic that threatens the sustainability of welfare systems. The investment demanded by health and care systems geared to an increasingly ageing population puts a strain on public financing systems [3]. Also, we must consider the difficulty of fulfilling the demand for professional carers to care for an increasing number of older people [4–6]. To meet these challenges and adequately address the needs of an increasingly ageing population, political representation and

academic research centres are proposing de-institutionalised care strategies [7, 8]. And under this umbrella, technologies emerge as realistic solutions to the challenges posed by caring for the elderly at home [9–11].

Mobile phones are central in the wide range of technological devices used in the deinstitutionalised care of older people [12]. This dynamic is part of what has come to be known as M-health or Mobile-health [13, 14], a proposal which owes its success, among other things, to the widespread use of this type of device among the population [15]. This common use also includes the older population, which has gradually adopted mobile phones as everyday devices for communication [12, 16]. For example, in the case of Spain, more than 80% of people over 65 years of age regularly use this devices [17].

It is within this context of the broad use of mobile phones among the older population that care apps for the elderly appear, fulfilling various functions such as the promotion of healthy behaviours or self-diagnosis [18]; those that contribute to their autonomy, such as those that help to overcome hearing or vision problems [19]; those that have GPS locators and those that alert relatives in case of emergencies; those that remind them to take medication or ingest water or food; and those that are games and exercises to prevent cognitive deterioration [20–22]. It should be noted that these apps use a series of images that identify and advertise the product, so that it can be downloaded. These images often represent the potential users—the elderly—, but these representations are not merely aesthetic because, due to the performative sense of the images, they construct meaning in the recipients, thus motivating the production of imaginaries, ways of understanding the world, and behaviours [23].

2 Objectives and Methodology

This article aims to assess the relevance of representations of older people used in health and care apps, given that they impact the emotional universe of potential users and have consequences on their behaviour, due to their performative nature.

We use Google Play Store to search for the apps—a digital distribution platform for Android mobile phone apps— which also functions as an online shop developed and managed by Google. Although its main product is applications, the platform allows downloading films, music, games, books, and magazines [22, 24]. These numbers make it the world's leading download platform. It has more than 3.5 million apps organised into 32 categories. It is also available in 77 different languages and can be found on more than 3 billion mobile devices [25]. During the COVID-19 pandemic, the Google Play Store surpassed 28 billion downloads, a growth of close to 35% globally [26]. When searching the apps, we use the following descriptors Health AND Care AND Healthcare AND Elderly OR Seniors. Various combinations of these descriptors resulted in 56 applications dedicated to the care and health of the elderly.

The criterion for selecting the materials to be analysed was the existence of figurative images representing old age in different formats. All non-figurative graphic representations—such as artistic-advertising type letters or abstract motifs—were excluded. This process resulted in the selection of 36 figurative images that have been collected on a website. The images displayed there have a caption that identifies them numerically,

mentions the developer and/or marketer, and indicates the link to the download page. The website can be accessed using the following QR code:



Fig. 1. QR Code Web: The Image of the Elderly in Health and Care Apps.

Afterwards, a formal analysis of the images was carried out. We consider the composition, colour, shapes, light, etc. [27], while attending the “social life” of the images, and variables such as class, gender, ethnicity, different abilities, etc. [28, 29].

3 Results

Three categories emerge from the critical analysis of the images: the representation of ideal models of ageing, the subordinate position of older people, and the absence of diversity.

3.1 The Representation of Ideal Models

Many of the older people depicted in the images analysed correspond to ideal models in several respects. Firstly, stylised or athletic bodies are abundant (Fig. 1, 3, 5, 6, 8, 13, 20, 27, 33–35), which does not correspond to the body morphology of most older people. This dynamic of idealisation is intensified in some images where the older person appears with grey hair as the only distinguishing feature of his age, but the images seem to represent someone younger because of the absence of wrinkles (Fig. 3, 13, 34) or the clothing associated with other age groups (Fig. 17).

Furthermore, many images seem to show that the users of the apps are in a high social position. The figures depicted correspond to affluent people who have a high degree of sophistication either by their clothing (Fig. 20, 35, 36), by the surroundings of the image with landscaped houses and tourist areas (Fig. 16, 17, 35, 36), or by using technological accessories that require a notable economic investment (Fig. 17, 36).

3.2 The Subordinate Position of Older People

On other occasions, the images do not correspond to the ideal representations mentioned above, but paradoxically, instead of promoting an inclusive and broad view of the experiences of older people, they project a subordinate image of this group. In these cases, the elderly included in the images appear devoid of agency, passive and dependent on

a caregiver (Fig. 2, 21, 24). This tendency, where the possible active role of the elderly person is obscured, reaches an extreme position in those images where their figure is blurred (Fig. 26) or disappears, giving all the prominence to the caregivers, although the app is addressed to the elderly (Fig. 26, 30). We also find images where, in the figure of the elderly, their problems are highlighted more than their potential, with images of disoriented elderly people or those with mobility difficulties (Fig. 4, 15).

3.3 Absences in Terms of Diversity

The images we have analysed show a remarkable homogeneity in terms of a number of variables such as ethnic origin, appearance, body morphology or the status of older people, which reveals a number of absences. Non-represented groups are often minorities or non-normative groups. For example, most of the people represented are of Caucasian origin, overshadowing the ethnic diversity that exists in many of the countries where potential users of these apps live. Non-normative bodies, which are abundant in older age groups, are hardly represented, nor are there any protagonists with a disability. The fact that the people showed in these ideal models project an affluent social status that displaces those who do not belong to these social representations.

Finally, in particular, some images seem to show the diversity of the elderly in a protagonist and active position. For example, individuals depicted with non-normative bodies doing exercises without the help of carers (Fig. 11, 32), but these images are more of an exception than a general trend.

4 Discussion

The results of the analysis are framed in some of the main debates about the images of older people in the world of advertising and marketing. As noted, the exhibition of ideal models of ageing responds to the logic of the market, where the representation of older people aims to arouse the desire for the product [30], in this case, to download the apps. This commercial sense shapes the images, so they have to be positive, visualising appealing lifestyles [30, 31]. Hence, we find images that show older people enjoying exercise in spaces such as gardens or seemingly well-off homes that denote success or a certain degree of sophistication that we can appreciate through their clothes and accessories.

The keys to these ideal models of behaviour, lifestyles, and bodies are constructed from the intertextual relationship and complicity that advertising has with the dominant ideology [30, 32]. In this sense, advertising content not only drives interest in the consumption of the product but also consolidates values already installed in the market society [32, 33]. Therefore, desirability is identified with personal success, as exemplified in the social status projected by the images. Advertising also generates an active relationship with the receiver as a producer of meanings and senses for those who consume it [30, 33]. Thus, advertising also draws horizons where what is desirable corresponds to what is appropriate and aspirational, to what one should become socially—in this case, what old age should be. And the consumption of the product is one of the vehicles to achieve this [31, 34].

On the other hand, in the context of images representing ideal models, the preeminence of athletic bodies, mainly in men, and stylised bodies in women, could be due to the very nature of the apps. The fact that the aim of many of these applications is self-care and the promotion and control of physical exercise in the elderly has its aesthetic correlate in the projection of images of active and healthy elderly people [30, 31]. But bodies as receivers and carriers of meaning are complex entities that denote more meanings than they can represent at first glance [35]. In this sense, athletic and slim bodies, in line with healthy models, respond to the body stereotypes of desire in capitalist societies [35, 36]. Thus the exposure of these bodies goes beyond its function of advertising the healthy habit and connects with the relationship of advertising to the reproduction of the dominant ideology [30, 32]. Moreover, this has its material manifestation in the bodies of consumers, as the desire that can be generated by the exposure of ideal bodies in app images, where one end would be to show off the physical qualities idealised in advertising, can have as a counterpart frustration and in more extreme cases some health disorders associated with diet and excessive physical exercise [36–38].

The other main category in which we frame the images of older people in health and care apps is that of the subordinate position of older people. Here the interpretative key is ageism in advertising. Ageism is defined as prejudices, stereotypes, and discrimination against people because of their age [39]. This is a perspective that we can observe in a large number of images where the figure of the elderly appears under negative stereotypes and is even hidden as demonstrated in the results of this research. Thus, advertising reproduces ideas about ageing that are dominant in society and perpetuates stereotypical images of the elderly [31]. According to this approach, the main stereotypes that are found are those that allude to older people's lack of capacity and agency. These assumptions deepen on the idea that physical and cognitive deterioration hinders the full exercise of their freedom, their rights and ability to function in everyday life. And under this idea, older people are presented as overly dependent on their caregivers [40, 41].

Furthermore, the under-representation of a diverse old age corresponds to the lack of representation of various groups in advertising and marketing in general. [42]. In the absence of ethnic diversity, structural racism is embodied in the assumption that ethnic minorities are not—or are less—potential consumers [43, 44]. Moreover, the absence of non-normative bodies is due to the relationship established between them and social failure [45, 46], which makes them undesirable bodies and obstacles to the sale of the product. A similar situation would occur with the less affluent classes, who appear to a much lesser extent because their lifestyles are less desirable than those of the upper classes and, therefore, less attractive to advertising narratives [47]. To overcome these absences, as well as to combat the stereotypes promoted by ideal representations of ageing and by ageism itself, we can take as a reference the participatory dynamics that have been implemented for some time in the design of technologies for older people under the idea of co-design. From this perspective, it is proposed that if older people actively participate in the design of technologies, these will be more relevant and appropriate to their needs [48]—a logic that can also be applied to the design of the advertising of these technologies.

5 Conclusions

The iconography used as a priority in apps dedicated to the health and care of the elderly is not very inclusive of the diversity within this group. The range of iconographic representations of older people, whether in drawings or photographs, rarely includes individuals of different ethnicities, with diverse disabilities, whose bodies do not conform to the normative canons, and in various social positions—especially those who do not belong to the affluent classes or the urban world. This lack of plurality can have negative consequences in terms of the relationship between the app and the potential users who participate in this diversity, given that, as they do not feel represented, they may show disinterest as they feel that the product is not designed for them. Likewise, this exclusionary iconography can generate frustration among those who do not see themselves reflected in the typologies of ideal user models represented in the images of the apps. Finally, it is also worth noting that certain typologies of images that present older people in subordinate positions to their caregivers deprive older people of their agency, perpetuating ageist stereotypes of older people as lacking initiative and overly dependent on their caregivers.

To overcome this exclusionary trend in iconographic representations of older people in health and care apps, the use of inclusive images that reflect the wide diversity of bodies, ethnicities and life trajectories of senior citizenship is encouraged. To this end, it is recommended that developers of such products, including programmers, health and care specialists, advertisers and marketing specialists, consult with professionals specialised in the rights and image of older people and, especially, with the perspective of older people. For the latter, councils can be formed with the participation of older people who reflect the plurality of the group, who have also received prior training in image and inclusion, and who express their points of view on the iconographies used in the apps, highlighting possible absences and proposing appropriate images based on their experience.

Finally, this work has proposed new epistemological horizons with which to continue enriching this line of research. We grounded our work in a mainly qualitative approach, consisting of semi-structured interviews and observation of the use of apps by the elderly, in order to understand in greater depth the universe of perceptions and emotions of this group as users of these technological services.

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Training Nurses for the Cardiopulmonary Resuscitation of the Adult and Older Adult in a Surgery Service

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Abstract. Health organizations must have nurses qualified to respond to people's different problems, which also include advanced skills in approaching people in cardiac arrest. Early and adequate intervention by nurses in emergency situations prevent health complications in adults and the older adult, as well as guarantees better future conditions for their well-being and for a healthier aging process. Aims: To evaluate nurses' perception of the difficulties in assisting people with Cardiorespiratory Arrest; evaluate the effectiveness of continuous training to overcome difficulties in assisting people with Cardiorespiratory Arrest. Methodology: A descriptive, correlational and longitudinal study was performed, using a quantitative approach. Data collection was performed through questionnaire was applied to 21 nurses from a Surgery Service. Results: The results of the study indicated that the training had an impact on improving the performance of the nursing team. The performance in Cardiopulmonary Resuscitation was highlighted through the consolidation of knowledge by the sample, improving the training of nurses. Conclusions: We conclude that in-service training is an essential contribution to the training of nurses in Cardiorespiratory Arrest contexts, cooperating to update knowledge and develop skills adapted to increasingly technological and complex environments. Considering that nurses are the professionals who detect Cardiorespiratory Arrest earlier, there is an indisputable need to carry out continuous training and implement strategies based on scientific evidence to improve the skills of clinical practice.

Keywords: Quality of Care · Emergency and Resuscitation · In-Service Training · Nursing Intervention · Older Adult

1 Introduction

Cardio Respiratory Arrest (CRA) can be silent, however, in some situations it may be possible to identify preceding CRA alert signals, such as: neurological changes,

alteration in the state of consciousness, convulsions, hemiparesis, deviation of the lip commissure, dysarthria, acute coronary syndrome symptoms, such as thoracic pain, sensation of tightening and weight, irradiating into the jaw, arms and posterior thoracic area, shock signals, such as change in coloration, moisture and decreased temperature of extremities – pale extremities, grey, humid or cyanotic, altered vital signals, in particular heart rate, respiratory rate and peripheral oxygen saturation (Souza et al. 2019). In this regard, is fundamental that nurses are watchful for a rapid identification of these signs and symptoms for early intervention in a timely manner (Silverplats et al. 2022a, b). This early detection is diffculted in situations where people don't have continuous monitoring (Park et al. 2022).

In surgical inpatient services, most people are not monitored, being CRA, when occurs, usually a sudden and unforeseeable event. According to the European Resuscitation Council (2021) it becomes necessary to identify and treat early physiological deterioration in order to prevent CRA (Soar et al. 2021). Monitoring the person and identifying warning signs is indeed extremely relevant. Nursing teams have a fundamental role concerning recurrent monitoring of vital signs and surveillance of changes in levels of consciousness (Gomes 2019).

Individuals who present CRA in hospital environment are dependent of an adequate prevention and supervision system. According to guidelines from the American Heart Association (2016), when CRA occurs, in a hospital environment, a successful intervention depends on a synchronized response from the multidisciplinary team. The Direção Geral da Saúde (2010) determines importance of the creation and implementation, at a national level, of Intra-hospital Medical Emergency Teams activated through an internal number, for deteriorating patients, besides CRA. Given the setting of inpatient services, without physicians permanently present, in the face of a CRA situation, nurses must intervene and call for help, contact the internal emergency team and initiate Basic Life Support (BLS) algorithm, using the crash cart (Entidade Reguladora da Saúde 2021).

Therefore, the objective of this study is to evaluate nurses' perception of the difficulties in assisting people with CRA and evaluate the effectiveness of continuous training to overcome difficulties in assisting people with CRA.

1.1 Materials and Methods

Cardiovascular diseases are the main cause of death in almost all members of the European Union (Organização para a Cooperação e Desenvolvimento Económico 2016), which covers diseases related to the circulatory system, including ischemic cardiopathy (that includes acute myocardial infarction) and stroke. Diseases of the circulatory system are still the major cause of death in Portugal, in 2020 (34 593 deaths). In this disease category, the most noteworthy are the deaths by stroke (11 439 deaths), ischemic heart disease (6 838 deaths) and acute myocardial infarction (4 086 deaths) published by the Instituto Nacional de Estatística (2020). Amongst the causes related to diseases of the circulatory system, deaths by cerebrovascular diseases and ischemic heart diseases are highlighted. Cardiovascular diseases have a major repercussion in economy and in healthcare systems (Covatti et al. 2016).

Continuous training in nursing is essential for professional development, answering to the demands of the people and the environment. The complexity of care prompts in

nurses the need to search for advanced training, in a continuous manner, working as an essential method for a professional update. For organizations, this continuous training shouldn't be perceived as an extra cost, but instead as an investment and development of their professionals. In this context, both organizations and professionals, should be aware of the formative requirements, being accountable for their learning through their professional career (Silverplats et al. 2022a, b; Jakub et al. 2022). Skills acquired and developed during nurses' foundation training will not be enough to sustain their professional life. Professionals, as well as organizations, must search for continuous learning and training in a way to improve skills, but also to acquire new ones (Martins et al. 2020).

Thus, the purpose of saving lives will depend, not only from sustained and high-quality scientific evidence, but also from effective training of healthcare professionals. Healthcare professionals, when caring for victims of CRA, must be able to implement effective resources systems, in order to improve survival after CRA (Silverplats et al. 2022a, b; Jakub et al. 2022). However, all healthcare professionals, regardless of their workplace, must have BLS training (Stiell et al. 2012). In their study, Pettersen et al. (2017) advocates that training should be continuous, so that there is no deterioration in the knowledge acquired.

CRA assistance involves, not only the need to advance in knowledge of healthcare professionals about the care provided, but also, it demands improvement of the multidisciplinary team performance, with acknowledging several competencies and recognition of difficulties during performance. CRA may be reversible, and, for that, it is necessary, apart from technical expertise, organization, training, teamwork, continuous development, and quality of customer care improvement (Greif et al. 2015). However, there are still some limitations in terms of performance, many of them hindered by physical structures, equipment resources, as well as functional allocation of human resources, sometimes ineffective, inadequate, and insufficient (Catalão 2017).

The nursing team is the professional group, in these contexts, that most detects CRA situations (Hernández-Padilla et al. 2015; Partiprajak & Thongpo 2016). It is assigned to them the responsibility of activating the emergency response team to a CRA event and to initiate BLS, providing the crash cart, preparing medications, as well as providing the care needed during CRA. By being unaware of the performance procedures, in total or in part, the professionals may be performing in error, which can be detrimental to the person in CRA, compromising his survival. Also, it is important to emphasize that inpatients in surgical services are mainly older adult people with several comorbidities, which leads to a major concern for CRA risk, and the importance of early recognition, prevention of complications and contribution to healthier aging (Park et al. 2022).

1.2 Questions

- What are the training needs of nurses in emergency and resuscitation situations in caring for the person in a surgical service?
- What is the impact of nurses' training in reducing difficulties in hospital CRA Care?

1.3 Methods

Study Design

The present study is classified as quasi-experimental, of pre-test and post-test type, without a control group.

Bearing in mind the typology of the study, it was divided into three phases:

1° phase: Evaluation of nurses' perception regarding their difficulties *in assisting in-hospital CRA*.

2° phase: Face to face and online training of nurses, responding to the needs identified in 1° phase.

3° phase: Evaluation of the impact of nurses' training regarding the difficulties *in assisting in-hospital CRA*.

Participants e Data Collection Techniques

A purposive sample of 21 nurses participated in the study of a surgical inpatient service which assists adult and older adult, of a Portuguese Hospital Centre, who agreed to participate in the three phases of the project.

The data collection instrument used was a two-part questionnaire: I) Sociodemographic, academic, and professional characterization; II) Intra-Hospital CRA Care Difficulties Perception Scale (Escala de Perceção de Dificuldades na Assistência à PCR Intra-Hospitalar – EPDAPI), built and validated by Catalão (2017).

The EPDAPI is composed of 49 questions of Likert-type scale, with five alternative answers (Strongly disagree, Disagree, Neither agree nor disagree, Agree, and Strongly agree). The items were scored from 1, to the answer Strongly Disagree, and 5 to the answer strongly agree. The highest scores correspond to more positive perceptions, in other words, the lesser perceived difficulty. The present validated scale is divided in 5 factors: performance in Cardiopulmonary Resuscitation (CPR); decision making competences in CPR; response in a timely manner in CRA; detection, alert and response to CRA; activation of differentiated aid in CRA.

1.4 Ethics Procedures

The project received a favorable opinion from the Ethics Committee of the Hospital Center (52022/02/02) where the study was conducted, being met all the principles of the *Helsinki* declaration.

Participants authorized and consented the participation in the study by signing the consent form, clarified for research participation. For data processing, descriptive statistical tests were used, namely frequencies, measures of central tendency and dispersion. To verify the impact of the training, the paired statistical tests were used because the distribution was found to be normal by applying the *Shapiro-Wilk* and *Levene's test*.

1.5 Aims

- To evaluate nurses' perception of the difficulties in assisting people with Cardiorespiratory Arrest.
- Evaluate the effectiveness of continuous training to overcome difficulties in assisting people with Cardiorespiratory Arrest.

2 Results

The 21 participants in the study were nurses ($n = 21$). Of the 21 nurses, 20 (95,2%) were female and 1 (4,8%) was male. According to Carapinheiro (1997) the population of nurses in hospitals has a percentage of 81% female nurses and 19% male nurses. This information illustrates the reality of nursing services in hospitals. It was verified that the mean age of the participants was 46.43 ± 9.74 years, with a recorded minimum age of 30 years, and a maximum age of 63 years. The average time of professional experience in the service was 16 ± 10.93 years, the minimum recorded period was 9 months, and the maximum period was 35 years. The average professional experience of the nurses in the service was 16.26 years.

According to Calotto (2015) work in hospitals requires that all professionals have sufficient clinical experience and maturity to be able to face and make difficult decisions, often with ethical and moral implications. It is also worth noting that not only clinical experience, but also the professional experience in service, become an excellent tool to support newest nurses. Peer learning enables skill acquisition, leading to better decision making. Regarding academic training, it was verified that only 3 (14,3%) are specialist nurses. The results obtained are in line with the studies from Bellan et al. (2010) and Ferreira et al. (2014), given that most nurses have no specialization course. In the specific case of caring for the older adult person, experiencing complex processes of critical illness and/or organ failure, it is expected that specialist nurses mobilize the knowledge and multiple skills to intervene in a timely and holistic manner to situations of hemodynamic instability, responding rapidly and providing, whenever necessary, highly complex technical care with the implementation of complex therapeutic protocols (Regulamento n.º 429/2018 de 16 de julho 2018).

3 Discussion

Therefore, it seems fundamental to us that in a surgical service which provides assistance to the adult and older adult, training in emergency and resuscitation is essential. In this sequence, we found that the sample is interested and considers in-service training necessary to improve the effectiveness of intervention in emergency and resuscitation situations. When asked the open-ended question, “Do you consider in-service training necessary to improve the effectiveness of intervention in emergency and resuscitation situations on the service? Why?”. Several answers were grouped into three dimensions: 1) Professional training; 2) Improvement of care; 3) Capacity and quality of response. Some of the responses per dimension are transcribed below (Table 1).

Of the nurses surveyed, 100% have training in BLS, which when compared with the study of Cunha et al. (2013), better results were obtained, since the average BLS training was less than 66%. Regarding the JCI guidelines, which certifies the hospital unit, it establishes as quality standards, in Education and Qualification of Professionals, the continuous in-service training, specifically in these cases to health professionals who provide “inpatient care (...) are trained and can demonstrate appropriate competencies in resuscitation techniques” (JCI 2017). In the study by Pettersen et al. (2017), 54% of the nurses had undergone training in emergency and resuscitation situations. The authors

Table 1. Dimensions of in-service training

Dimensions	
Professional Training	<p>“Because in general there are few emergency situations, and when they happen, we are not prepared” (Q06)</p> <p>“Because training in emergency situations and resuscitation is necessary” (Q02)</p>
Improvement of care	<p>“New knowledge update” (Q12)</p> <p>“Systematization in order to act in line with norms, more effectively and efficiently” (Q06)</p>
Capacity and Quality of Response	<p>“For professionals involved in the multidisciplinary team to interact effectively, quickly and in harmony to favor healthcare in an emergency situation” (Q20)</p> <p>“It is essential, the training and updating of knowledge, increasing tranquility and confidence in the event of a real emergency/urgency” (Q04)</p> <p>“When all professionals have the knowledge of the procedures to be adopted in this situation, the waste of time is reduced and consequently the intervention will be more adequate and effective” (Q10)</p> <p>“Scarcity of clinical cases of CRA limits response capacity” (Q16)</p>

concluded that nurses, who underwent professional training, had better outcomes in their clinical practice. According to adult training paradigms, this type of training promotes learning through the daily experiences of health professionals, who are the central figure in the educational process, in a perspective of personal and professional development (Aleixo & Almeida 2014). Considering the above, we understand that our results also converge with these studies, as they emphasize the importance of in-service training to improve their performance capacity, and simultaneously improve the quality of the care provided, thus obtaining health gains.

For these reasons, and to meet the training needs of the nurses, a training course was designed to improve the nurses’ knowledge in emergency and resuscitation situations, and consequently, to empower them. Therefore, in Table 2 we can see the results of applying paired student’s t-test for the total and for the EPDAMI Factors pre-training (T1) and post-training (T2).

As we can see from the results presented (Table 2), the difficulties decreased not only in total, but in each of the 5 factors, showing that the training had an impact.

The increase in knowledge after training is a consistent finding. Some authors report an increase in health professionals’ theoretical knowledge after training (Martins et al. 2020).

Table 2. Results of the paired t-test application for the EPDAPI factors pre-training (T1) and post-training (T2).

		Mean	Standard deviation	t	p
F1	Performance in CPR (T1)	17,714	5,405	-3,89	<,001
	Performance in CPR (T2)	19,095	5,512		
F2	Competence for decision making in CPR (T1)	34,905	7,816	-4,56	<,001
	Competence for decision making in CPR (T2)	38,477	6,779		
F3	Timely response to CRA (T1)	18,136	4,556	-4,40	<,001
	Timely response to CRA (T2)	21,714	2,795		
F4	Alert, Detection and Response in CRA (T1)	21,405	4,121	-5,88	<,001
	Alert, Detection and Response in CRA (T2)	25,857	2,515		
F5	Activation of Differentiated Help in CRA (T1)	15,619	3,216	-4,00	<,001
	Activation of Differentiated Help in CRA (T2)	18,810	1,691		
TOTALS	Total (T1)	107,78	17,530	-6,84	<,001
	Total (T2)	123,96	13,533		

From the results in Table 3, we can also see that 47 out of 49 had improvement in the difficulties in intra-hospital CRA care.

Table 3. Descriptive statistics of the items in the pre (T1) and post (T2) training (n = 21).

Questions	N	Mean		Standard Deviation	
		(T1)	(T2)	(T1)	(T2)
1-In your service, a patient in CRA is assisted in less than 5 min with BLS	21	3,95	4,62	0,973	0,740
2- In your service, a patient in CRA is assisted in less than 5 min with SAV	21	2,67	3,48	0,966	0,814
3- In your service, it's possible to monitor a patient/victim in 90 s	21	3,85	2,48	1,235	1,401
4- In your service, CPR maneuvers are initialized as soon as CRA is detected, and only after differentiated help is activated	21	2,48	2,29	1,401	1,189

(continued)

Table 3. (continued)

Questions	N	Mean		Standard Deviation	
		(T1)	(T2)	(T1)	(T2)
5- In your service, as soon as CRA is detected, you wait for differentiated help to initiate CPR maneuvers	21	1,71	1,81	1,056	1,289
6- In your service, there is equipment available for CPR within 4 min of the site of the CRA	21	3,95	4,67	1,203	0,577
7- In your service, a crash cart is available for immediate use	21	3,71	4,48	1,454	0,873
8- Crash carts have equal contents regardless of the service they are in	21	3,52	4,19	1,289	0,981
9- In your service, all patients at risk of cardiac arrest are monitored	21	3,50	4,19	1,16	0,814
10- All the professionals in your service, know where the crash cart is located	21	4,67	4,95	0,577	0,218
11- The crash cart is always replenished with its approved material	21	4,52	4,86	0,814	0,359
12- The location of crash carts is the same for all services	21	3,05	4,29	1,161	0,902
13- In case of need, there are enough vital sign monitors in relation to the number of patients/victims	21	3,38	3,95	1,431	0,973
14- All professionals become aware, simultaneously, that a cardiac arrest event is occurring (e.g., use of crash bell with audible alarm; use of the code word "Stop" in voice projection)	21	3,67	3,76	1,238	1,221
15- Usually you request differentiated help, in case of CRA, over the phone	21	4,48	4,81	0,602	0,402
16- When you request differentiated help, for the referred support service (e.g., General emergency department, internal emergency team), it is always the health professional assigned to the assistance who answers the phone	21	3,14	4,29	1,153	1,007
17- When you call, requesting the differentiated help, on average they answer your phone in less than 1 min	21	3,19	4,29	1,327	1,056
18- Once the differentiated help is requested, it arrives at the scene of the PCR event in less than 4 min	21	3,29	4,33	1,056	0,730
19- Differentiated help is familiar with the current BLS and ALS guidelines	21	4,19	4,95	1,014	0,218
20- Differentiated help operates with its own team set up for CRA assistance	21	3,90	4,62	1,136	0,498

(continued)

Table 3. (continued)

Questions	N	Mean		Standard Deviation	
		(T1)	(T2)	(T1)	(T2)
21- Differentiated aid provides for the installation of the patient/victim of CRA, after CPR, in an Intensive care unit or Emergency Room	21	3,43	4,67	1,248	0,577
22- All PCR events are recorded on a specific form, for future audits and Quality Management System interventions	21	2,67	2,38	1,065	0,973
23- A debriefing (a short meeting) is always held with the health professionals involved and the differentiated help team to find out what needs to be done and what aspects need to be improved	21	1,81	2,10	0,873	0,944
24- All professionals know the extension phone number they should call to request the differentiated help	21	4,10	4,95	1,091	0,218
25 - The extension phone number to call to request differentiated help is available and readily accessible	21	4,05	4,86	1,117	0,359
26- To request differentiated help, there is only one telephone extension number, on a single, direct line, for this purpose	21	4,48	4,95	0,981	0,218
27- You have difficulty handling the Defibrillator Monitor safely	21	2,38	2,57	1,396	1,207
28- You usually use the Defibrillator Monitor	21	1,29	1,52	0,561	0,680
29- In CPR, you have no doubts in the BLS algorithms	21	3,24	4,14	1,670	1,153
30- In CPR, you have no doubts in the ALS algorithms	21	2,14	2,38	1,108	1,117
31- You know resuscitation medications	21	3,52	2,48	0,873	1,030
32- You use resuscitation medications regularly	21	1,95	2,00	0,973	0,949
33- In the past 12 months, you have initiated CPR maneuvers in at least one patient	21	1,95	2,14	1,284	1,424
34- You know all the materials in the crash cart	21	3,48	4,10	1,123	0,944
35- You can handle all the materials in the emergency car without difficulty	21	3,10	3,62	1,136	0,973
36- You know the CRA assistance system instituted at the hospital level (to call the support service)	21	3,95	4,71	1,161	0,561
37- You know the Glasgow Coma Scale	21	3,90	4,38	1,091	0,669
38- You frequently use the Glasgow Coma Scale	21	2,29	3,05	1,189	1,161
39- You can always tell if a patient/victim's breathing is being effective	21	3,90	4,19	0,889	0,602

(continued)

Table 3. (continued)

Questions	N	Mean		Standard Deviation	
		(T1)	(T2)	(T1)	(T2)
40- You always assess the quality of the peripheral pulse, in a patient/victim who is unresponsive to external stimuli	21	3,76	3,95	0,889	0,921
41- You easily recognize a critically unwell patient/victim	21	3,95	4,14	0,921	0,793
42- When monitoring the patient/victim, you easily recognize emerging cardiac tracings	21	2,81	3,14	1,078	1,014
43- In an unexpected place (e.g., elevator, stairs), if you are called to help in a CRA event, you usually take a leading role	21	2,48	2,52	0,814	0,873
44- In CPR Maneuvers, you prefer to be led instead of leading	21	4,05	3,71	1,071	1,231
45- When you collaborate in assisting a patient/victim in cardiac arrest, you perform the procedures with nervousness	21	2,71	2,81	1,102	1,030
46- When you collaborate in assisting a patient/victim in cardiac arrest, you perform the procedures with anxiety	21	2,95	2,81	1,284	1,289
47- Do you feel emotionally prepared to act in CRA	21	3,24	3,57	1,091	0,926
48- You feel technically prepared to act in CRA	21	2,81	3,33	1,123	1,155
49- You are confident in your ability and technical expertise to act on patients/victims in CRA safely	21	3,24	3,71	1,044	0,956

The main limitations of this study are related to the sample size, since the study was conducted only in one service and in one hospital institution. As a recommendation for the future, it would be an asset to conduct the study with other health professionals who work in inpatient services. In this sense, we suggest the replication of this study involving other professionals from the multidisciplinary team and in other institutions, in order to have a global view of the training needs and the perception of health professionals on in-hospital CRA care. It is recognized the evident need to maintain the development of actions aimed at qualification in emergency situations and resuscitation, in order to improve the quality of care, contributing to an earlier intervention in a situation of pre-arrest or even in CRA, which may prevent health complications for hospitalized adults and the older adult.

4 Conclusions

This study was conducted in an inpatient surgical service with 21 nurses, with an average age of 46.43 years, with 20 female nurses and 1 male nurse, with an average of 16 years of work in the service where the study was carried out. Of the sample, one of the nurses had a management role and two nurses were specialists.

In summary, the study showed that it is possible to empower, improve and optimize the intervention of nurses through training in the context of emergency situations and

resuscitation. The use of the EPDAPI scale revealed to have numerous advantages in its application in the inpatient context in a surgical service, and may also have in others, with different sociodemographic realities. In the present study, when we observe the results of the pre (T1) and post (T2) EPDAPI training, we noticed the improvement in the quality of care with the training of nurses regarding the knowledge of the defibrillator monitor, action algorithms, improvement in leadership and decision making leading to a better response in time to CRA, with assistance in less than 5 min with BLS and activation of the internal emergency medical team to initiate ALS within the first 5 min. Thus, we conclude that it is necessary to periodically implement in-service training with theoretical sessions and clinical case training, through simulation, to improve the effectiveness of knowledge acquisition, as well as to replicate the training over time. The results of this study showed the importance of training inpatient nurses in the immediate care of CRA, with the development of skills from certified BLS and ALS courses. It is also important to adjust the nurse ratios to the needs of the contexts and people, as well as to promote the integration of specialist nurses in the teams in order to improve the quality and safety of care for the older adult and people with multiple comorbidities, who are more fragile in their health-disease process and are at greater risk of having a CRA.

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Health Gains from Rehabilitation Nursing Care in Patients Undergoing Upper Abdominal Surgery

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Abstract. Objective: To identify the health gains resulting from rehabilitation nursing care, at the self-care level, in patients undergoing upper abdominal surgery.

Methodology: Systematic review of the literature with studies that included participants undergoing scheduled surgery of the abdominal and thoracic segments; with respiratory rehabilitation intervention in the pre and postoperative periods.

Results: Studies with people with respiratory disease and aged 18 years or older, published from January 2017 to June 2022, in English, were included. PubMed was consulted, and after analysis of the references obtained, a final sample of five articles was obtained, which were integrated into this study. **Conclusions:** There is a direct improvement in respiratory functionality after a respiratory rehabilitation program. We highlight the importance of rehabilitation programmes focusing on patient empowerment in the preoperative period to prevent complications, particularly pulmonary complications, compared to a rehabilitation programme without preoperative follow-up. Gains resulting from nursing interventions were identified in terms of patient satisfaction, health promotion, prevention of complications, well-being and self-care, cost reduction and healthcare organization.

Keywords: Health gains · Rehabilitation nursing · Abdominal surgery · Respiratory rehabilitation

1 Introduction

The Postoperative complications represent a challenge in healthcare, being one of the main causes of high rates of morbidity and prolonged institutionalization of patients, with an impact on the psycho-physical-social level of the patient undergoing abdominal surgery and high economic costs [1].

Postoperative complications are all those that negatively affect the persons recovery. These can be pain, anxiety, change in body image, inherent consequences of immobility, functional deficits, respiratory changes, which lead to changes in the quality of life of the person and family [1, 2].

Early rehabilitation nursing, based on therapeutic interventions of presented functional reeducation and motor reeducation, assumes a relevant role in the patient's recovery process. It is relevant in the reduction of associated complications, increase in functional capacity, increase in quality of life and prevention of readmissions. Rehabilitation has a beneficial effect on the recovery process, for the treatment of the disease and for adequate use of health services [1, 3].

In a study to analyze the recovery of patients who underwent abdominal surgery [4], it is observed that most of these patients highlight that the multidisciplinary health team, especially nurses, are overwhelmed with work, and that postoperative care for patients is not as efficient as it could be. In this way, three factors are presented as fundamental in this process:

- 1) Absence of clear guidelines for postoperative care for patients.
- 2) Patients are not cooperative with recovery.
- 3) Need for multidisciplinary coordination to assist in recovery.

The implementation of functional respiratory rehabilitation (FRR) programs has shown relevant results in patients undergoing abdominal surgery, given that respiratory muscle weakness and diaphragmatic dysfunction are associated with postoperative pulmonary complications [4]. It is also observed that respiratory rehabilitation programs should be used to promote self-efficacy and reduce dyspnea in patients without knowledge of respiratory rehabilitation techniques [5].

Recent data allow us to observe that intervention groups in preoperative respiratory training and rehabilitation programs have greater resistance capacity, greater respiratory rate capacity, reduced postoperative respiratory complications and shorter postoperative recovery time [6, 7]. The preoperative training of the inspiratory muscles allows an increase in their resistance [8]. And, even in cases where the intervention groups have higher body mass index and lower lung function, better values of preoperative respiratory capacity and rate were observed [9].

In terms of cost-effectiveness, recent studies have shown that preoperative rehabilitation programs have an economic benefit for hospitals, due to patients' ability to recover sooner after surgery and fewer postoperative respiratory complications, translating into improved quality of life for patients [10]. In addition, it is observed that respiratory rehabilitation training and learning of breathing exercises help to reduce the incidence of post-surgical pulmonary complications by half during the hospitalization period [11].

In this sense, the techniques used by nurses specializing in rehabilitation nursing in respiratory functional reeducation must be accompanied by Activities of Daily Living (ADL) training, focusing on energy conservation techniques, as well as performing localized muscle strengthening exercises and systemic muscle strengthening. The need for support products that promote greater patient independence should also be assessed [12].

2 Objective

To identify the gains resulting from rehabilitation nursing care, in users who undergo upper abdominal surgery.

3 Methodology

Systematic literature review is a research method that provides broad information about a subject/problem, building a comprehensive body of knowledge, with methodological precision. The analysis of the state of the art in reference investigations facilitates the incorporation of evidence and the transfer of knowledge to clinical practice [13, 14].

In this literature review, we considered seven distinct phases:

1. Construction of the research protocol so that this research is conducted with precision and rigor
2. Formulation of the question using the acronym PICO
3. Search for studies with definition of descriptors, search strategies in electronic databases
4. Selection and review of studies by applying predetermined inclusion and exclusion criteria
5. Critical evaluation of each article using methodological quality evaluation criteria.
6. Data Extraction
7. Summary of findings/results

The PICO framework can be used to define the theme of an systematic literature review, translating its evidence and effectiveness by specifying Population, Intervention, Comparison if applied and Outcome [14]. Given the framework addressed (Table 1), an adaptation was prepared, in which “C” is excluded, as it does not relate to the question formulated, and the following question was elaborated: “What are the gains resulting from the intervention in rehabilitation nursing care, developed in the pre and postoperative periods in the person undergoing upper abdominal surgery?”.

Table 1. Analysis of the PICO Framework

Population	Intervention	Outcomes
People undergoing upper abdominal surgery	Rehabilitation nursing interventions within the scope of functional respiratory rehabilitation	health gains

As a research strategy, in addition to the PICO question to formulate the research question, English literature published between 2017 and 2022 was considered in the PubMed search engine and selected as inclusion criteria: English language, full articles, publications from 2017 to 2022, PubMed database and age of participants 18 years or older.

The present systematic literature review contains exclusively studies that included participants who underwent scheduled surgery of the abdominal and thoracic segments; with respiratory rehabilitation intervention in the pre and postoperative periods; Study interventions must include specific rehabilitation nursing interventions and/or rehabilitation programs in hospitals, care institutions and/or outpatient settings, and may be associated and integrated into an interdisciplinary team.

The exclusion criteria for studies considered were: language other than English;; not clearly mentioning the type of study treated or publication date; ambiguous methodology; studies related to respiratory rehabilitation in people undergoing cardiac surgery or in segments other than the thoracic and abdominal, as well as articles published in thesis, dissertation or monograph format.

In order to select controlled quality descriptors, the descriptors in health sciences (DECS) and medical subject heading (MESH) MeSH criteria were used. Therefore, the

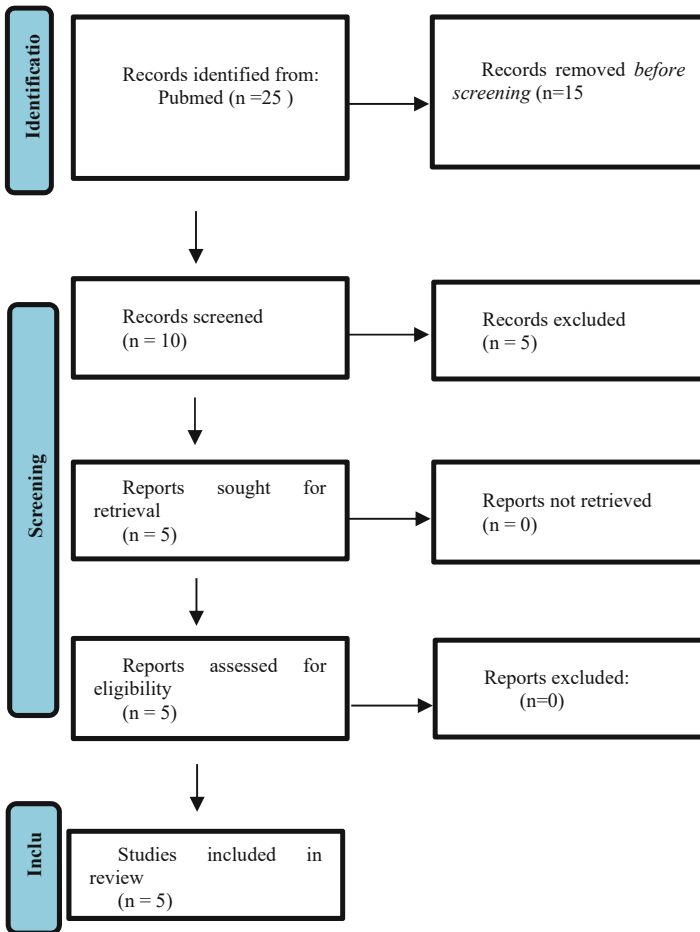


Fig. 1. Flow diagram of identification of studies via Pubmed.

following descriptors were used: “Breathing exercises” “Preoperative Exercise” “Post-operative complications” “surgery” “Outcomes” conjugated with the Boolean AND. The surveys were carried out in June 2022.

The choice of a single search database, PubMed, made it possible to obtain a satisfactory number of results, with the required level of evidence and methodological quality, for the specific descriptors and criteria defined. After analyzing the references obtained, a final sample of five articles was obtained that were integrated to develop this research, whose selection process is shown in the diagram below (Fig. 1).

The articles obtained were analyzed and evaluated, in order to verify their level of evidence, according to the Joanna Briggs Institute Manual. The JBI Critical Appraisal Checklist questionnaires were completed for the randomized studies, in order to verify the methodological quality. Table 2 shows the titles of the 5 articles obtained, as well as the level of evidence and methodological quality.

Table 2. Level of evidence and results of the application of the JBI Critical Appraisal Checklist for randomized controlled trials.

Title/Authors/Year	Level of evidence	Methodological quality
E1: Preoperative physiotherapy for the prevention of respiratory complications after upper abdominal surgery: pragmatic, double blinded, multicentre randomised controlled trial [11]	1.c – Randomized Controlled Stud	13/13
E2: Preoperative exercise training prevents functional decline after lung resection surgery: a randomized, single-blind controlled trial [9]	1.c – Randomized Controlled Study	13/13
E3: Two-Week Multimodal Prehabilitation Program Improves Perioperative Functional Capability in Patients Undergoing Thoracoscopic Lobectomy for Lung Cancer: A Randomized Controlled Trial [7]	1.c – Randomized Controlled Study	12/13

(continued)

Table 2. (continued)

Title/Authors/Year	Level of evidence	Methodological quality
E4: Preoperative physiotherapy is cost-effective for preventing pulmonary complications after major abdominal surgery: a health economic analysis of a multicentre randomised trial [10]	1.c – Randomized Controlled Study	12/13
E5: Systematic short-term pulmonary rehabilitation before lung cancer lobectomy: a randomized trial [6]	1.c – Randomized Controlled Study	12/13

For data extraction, the author, year, country, study objective, methodology, results, conclusions, and level of evidence were considered. All steps were performed by two reviewers (PR and AM) independently and when there was no consensus, a third reviewer (RF) entered the tiebreaker.

4 Results

After reading and analyzing the selected articles, a synthesis of them was carried out, presented in Table 3, which contains the identification of the study, its objective and participants, the methodology adopted, as well as the results and conclusions obtained.

Table 3. Synthesis of the analysis of the selected articles.

Study identification	Objective	Methodology	Results/conclusion
E1: Boden et al. (2018) Australia [11]	To analyze the effectiveness of a preoperative rehabilitation program to reduce postoperative pulmonary complications after upper abdominal surgery	Prospective, multicenter, blinded study (patient and assessor), test group and placebo group. 441 adults (≥ 18 years) eligible for upper abdominal surgery, randomly selected to receive an information manual (n = 219; control) or preoperative rehabilitation session (n = 222; intervention) and 12-month follow-up	The incidence of postoperative pulmonary complications within 14 days of hospitalization was halved in the intervention group when compared to the control group Strong evidence that preoperative education and training 6 weeks before upper abdominal surgery reduces the incidence of postoperative pulmonary complications

(continued)

Table 3. (continued)

Study identification	Objective	Methodology	Results/conclusion
E2: García et al. (2017) Spain [9]	To investigate the effects of a preoperative pulmonary rehabilitation program in lung cancer patients undergoing video-assisted thoracic surgery	Randomized study, two groups, intervention and control. Patients with suspected or confirmed diagnosis of lung cancer undergoing video-assisted thoracic surgery. Patients in the intervention group attended resistance training sessions and breathing exercises five times/week	40 patients were randomized and 22 completed the study (10 in the pre-rehabilitation group and 12 in the control group) After the program, there was a significant improvement in exercise tolerance, physical capacity and muscle strength. Three months after surgery, significant differences were observed in exercise tolerance capacity, physical capacity, and upper and lower limb muscle strength. The preoperative pulmonary rehabilitation program demonstrates improvement in functional capacity after surgery
E3: Liu et al. (2020) China [7]	To investigate the effect of a two-week preoperative rehabilitation program, in a home context, on functional capacity in patients undergoing lobectomy	Randomized study with 73 patients. The intervention group received a 2-week rehabilitation program before surgery, including aerobic and resistance exercises, breathing training, nutritional counseling and psychological counseling. Patients in the control group received only usual medical care	There were no differences in psychological condition, quality of short-term recovery, postoperative complications in the 3 days following surgery and in the mortality rate. Vital capacity on exertion was higher in the intervention group. The 2-week program can produce clinically significant improvements in functional capacity

(continued)

Table 3. (continued)

Study identification	Objective	Methodology	Results/conclusion
E4: Boden et al. (2020) Australia [10]	Cost-effectiveness of preoperative rehabilitation in reducing postoperative pulmonary complications and improving quality of life after abdominal surgery	Cost-effectiveness analysis from a hospital perspective in a multicenter, randomized, blinded study. 441 adults awaiting elective upper abdominal surgery. The experimental group received information and a 30-min face-to-face session, involving respiratory education and breathing exercises. The control group received only information regarding the rehabilitation program	Preoperative rehabilitation had a 95% probability of being cost-effective with benefits for hospitals. The improvement in cost effectiveness and gains in the quality of life of patients were detected after the intervention The goal of preoperative rehabilitation in preventing postoperative complications was cost-effective from a hospital perspective. For each postoperative pulmonary complication prevented, preoperative rehabilitation should cost hospitals less than the estimated costs of treating postoperative pulmonary complications
E5: Lai et al. (2017) China [6]	To analyze the impact of 1 week of high-intensity preoperative exercise in lung cancer patients and risk factors for postoperative pulmonary complications	Randomized study with 101 participants. The study group received a high-intensity exercise program. The control group received standard preoperative care	Peak expiratory flow is shown to be increased in the intervention group when compared to the control group. The intervention group had a shorter postoperative recovery time when compared to the control group, as well as a decreased incidence of pulmonary complications

5 Data Analysis and Interpretation

After analyzing all the selected studies, several health gains were identified, consistent to rehabilitation nursing care, in the patient undergoing the surgical process. Table 4 details these gains resulting from rehabilitation nursing interventions, depending on the quality standards of specialized rehabilitation nursing care [15].

After analyzing the selected papers, it can be identified that all of them converge towards a direct improvement of respiratory functionality, after a respiratory rehabilitation program, giving special importance to the control of symptoms and the training of patients, in the preoperative period, with success in the rehabilitation process.

It is possible to identify gains resulting from nursing interventions in all descriptive quality statements. Gains were identified in terms of customer satisfaction, health promotion, prevention of complications, well-being and self-care, cost reduction and health care organization.

Table 4. Gains resulting from the interventions of the rehabilitation programs instituted in the surgical patient.

Categories	Gains resulting from rehabilitation nursing interventions
customer satisfaction	Increased user understanding of the care plan [7, 11]
Health promotion	Increased perioperative knowledge [11] Increased personal responsibility for your health [7, 11]
Prevention of complications	Muscle strengthening [9] Reduction of time to first postoperative lift, and ambulation [7, 11] Decreased postoperative complications [6, 9, 11] Decreased mortality rate [11] Decreased length of stay [6]
Well-being and self-care	Pain control [6, 11]; Reduction in respiratory distress/dyspnea [6, 9, 11] Training for self-care [11] Increased Functional Independence [7, 9, 11]; Improved quality of life [7, 9]
Reduction of expenses	Decreased hospital costs [6, 9, 10]
Organization of health care	Multidisciplinary intervention [6, 7, 10, 11] Qualification of professionals [7, 10, 11]; Standardization of care and frequency of interventions [6, 7, 9–11] Pre and postoperative follow-up [6, 7, 9–11]

In terms of user satisfaction, we can say that the increase in the user's understanding of their care plan is a relevant health indicator, because the effectiveness of the rehabilitation nurse intervention plans occurs through satisfaction, and user motivation for its implementation, as they feel valued and active agents in their recovery process [3, 11].

The review analyzed refers to the importance of carrying out rehabilitation programs with an emphasis on patient empowerment in the preoperative period, in order to prevent postoperative complications, namely pulmonary complications. In addition, it is possible to identify that carrying out respiratory rehabilitation programs allows for the maximization of pulmonary function and a greater gain of functional independence, so that the participants of the groups that integrated the programs in the preoperative period, revealed a lower complication rate, as well as reducing the length of stay in the health unit, reducing the costs of the same [6, 9, 11].

Based on the present literature, it is clearly identified that the introduction of a preoperative rehabilitation program is advantageous, compared to only a traditional follow-up, without rehabilitation. In addition, the most recent data is consensual on the benefits of implementing rehabilitation programs, in the pre and postoperative period, concomitantly, when compared with their introduction in one of these periods only. The early initiation of a rehabilitation program in the preoperative period offers benefits compared to a program initiated only in the postoperative period, because at this stage,

due to pain, nausea and anxiety, the patient's ability to understand and execute the interventions is compromised. Preoperative preparation reveals a motivated and less anxious patient in his postoperative recovery [5, 11].

The implementation of a respiratory rehabilitation program for people undergoing abdominal surgery not only improves respiratory function but also reduces the incidence of pulmonary complications, enabling the user to self-care, leading to gains in functional independence, as there is an increase in muscle strengthening and, consequently, a decrease in dyspnea [7].

In terms of the user's well-being and self-care, health education interventions were carried out, where the benefits of rehabilitation programs are explained, as well as their advantages in reducing postoperative complications. Preoperative breathing training, including deep breathing, coughing, and incentive spirometry, contributed to improving lung function and decreasing the incidence of postoperative pneumonia and atelectasis. The preoperative rehabilitation program can also help to strengthen the respiratory muscles that affect functional capacity as well as lung function after thoracic surgery [7].

The length of hospital stay is a multifactorial effect, so even with the preoperative preparation and a decrease in pulmonary complications, it is not possible to say that this alone reduces the length of stay. As such, these factors must be taken into account and the focus increases to the need for a broader program that includes pre- and postoperative follow-up [11].

The rehabilitation nurse thus has the role of an educating agent for health, in order to enhance the knowledge of the user, leading him to increase his personal responsibility in his recovery process through literacy. The rehabilitation nurse has a prominent role in promoting quality of life, maintaining and promoting well-being, as well as in the recovery of functionality, emphasizing the promotion of self-care to maximize capacities [1].

Based on the results obtained, it can be identified that a structured rehabilitation program based on scientific evidence produces health gains in patients undergoing upper abdominal surgery, and as a suggestion for improvement, research should be promoted.

6 Final Considerations

With this systematic review of the literature, it was possible to observe the effectiveness of respiratory rehabilitation programs, applied in the pre and postoperative periods, as well as the significant gains in rehabilitation nursing care.

The literature has shown that there is effectiveness in preventing the occurrence of postoperative complications of the pulmonary spectrum, since an adequate intervention plan promotes recovery and maximization of lung capacity and function.

In this way, in order to respond initially formulated, the gains resulting from the intervention in rehabilitation nursing care for the person undergoing upper abdominal surgery are: the increase of the user's understanding of the care plan, as well as the personal responsibility in their health-disease process, leading to training for self-care, functional independence and quality of life; pre and postoperative follow-up, with

a multidisciplinary team, where uniformed care is provided; in the prevention of complications, early rise and ambulation are identified, as well as the reduction of respiratory difficulty and pain control, thus leading to a decrease in hospitalization time and mortality rate, reducing hospital costs.

Thus, it is considered extremely important to understand which indicators are sensitive to rehabilitation nursing care, based on scientific evidence, allowing for a reflective practice. This highlights the importance of greater promotion of respiratory rehabilitation programs with a rehabilitation nurse, in the pre and postoperative periods, in patients undergoing abdominal surgery.

Despite the gains identified in this review, we consider that there are some limitations, namely, the number of databases and the search only in English.

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The Intervention of Rehabilitation Nurses in Patients with Deglutition Disorders: A Systematic Review

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Abstract. Background: Eating is an activity without which an individual cannot survive, as such, all the processes inherent to food intake must take place harmoniously so that the person eats effectively. Swallowing is the first process and when it is compromised, will affect the nutrition of the patient, and may also increase the risk of aspiration of food and liquids. This process is divided into several phases: oral preparatory phase, oral phase, pharyngeal phase, and esophageal phase. In these steps there are movements that form the food bolus and take it from the mouth to the stomach. **Objective:** The aim of this systematic review is to gather the most recent finding about the rehabilitation interventions that improve swallowing movements. **Methodology:** Systematic review with search in the EBSCO Host database, with the MeSH terms: [“Deglutition Disorders” or Dysphagia] and “Rehabilitation Nursing” and “Interventions”. Only the studies written between 2018 and 2020, articles written in english, portuguese or spanish and the population had deglutition disorders. **Results:** A total of 8 articles were included, we can see the results of many different interventions regarding the rehabilitation in deglutition disorders. We can divide them in four types: postural and behavioural interventions; oral motor exercises; swallowing training; and current stimulation interventions. **Conclusions:** Scientific evidence demonstrate that when swallowing is compromised, rehabilitation programs can help to reduce and prevent complications. Supporting compensatory swallowing techniques makes this process safer and improves self-care and the patient’s quality of life.

Keywords: Deglutition Disorders · Rehabilitation Nursing · Early Intervention Education · Systematic Review

1 Introduction

Planning interventions, based on functioning, promoting education and setting goals, capacity rehabilitation nurse specialists with skills and tools to maximize functioning of patients. One of the components of self-care that may need rehabilitation care concerns eating and drinking [1, 2].

Human life cannot be maintained for a long time without food, so the feeding activity is essential to survival. It is a time-consuming activity because the food itself has to be sought out and prepared and also we spend a lot of time eating. The way meals are taken and the foods and beverages selected reflect the influence of sociocultural factors on this life activity. There are even several factors that can influence this activity of life and affect an individual's diet, these being physical, psychological, sociocultural, environmental and political-economic [3].

According to the International Classification for Nursing Practice (ICNP) (2019), the focus "Swallowing" is defined as: "Eating or Drinking: Passage of fluids and decomposed food from mouth by movement of tongue and muscles through throat and oesophagus to stomach" [4]. In this process, 26 muscle pairs and 5 cranial nerves are involved [5].

In its neurological control are present structures such as the brain, the basal ganglia, the hypothalamus, the tonsils, the cerebellum and the midbrain, the brainstem and the cranial nerves. Regarding the latter, pairs V, VII, IX, X and XII are the ones with the greatest participation, although they all contribute to effective swallowing. On the other hand, the anatomical structures present in swallowing are the oral cavity, pharynx, larynx and esophagus [5].

Swallowing can be divided into four phases: preparatory oral phase, oral phase, pharyngeal phase and esophageal phase. In these phases the food bolus is formed, and several voluntary movements are performed in the first two phases and involuntary in the last two, in order to direct the food bolus to the stomach. The pharyngeal phase occurs in a short period of time, however it represents a moment with a very important function, protecting the airway [6].

Coordination between chewing, swallowing and breathing is also an important factor throughout this process, as it is through this coordination that aspiration of food and liquids is prevented. During mastication, there is a decrease in the duration of the respiratory cycles, while during the swallowing of solids, there is a pause in breathing and in the swallowing of liquids, which begins in the expiratory phase and also ends with an expiration [6].

Swallowing disorders can be caused by various functional or structural alterations of the anatomical structures involved in any phase of the process. Dysphagia consists of difficulty or discomfort during swallowing and can cause malnutrition, dehydration, pneumonia or airway obstruction [6, 7].

In people with disorders in the state of consciousness, attention, coordination, strength, motor planning, sensitivity, visual fields or impulsive behaviors, it is important to always consider the risk of dysphagia in order to avoid aspiration of food. The process of aspiration is characterized by the passage of food or liquid through the vocal cords. In a normal situation, the person has an intense cough reflex, however there may be changes in sensitivity in the surrounding anatomical structures, consequently there is no reflex response, eventually preventing the recognition of one of the most evident signs of dysphagia [5, 6].

A detailed assessment of swallowing is imperative before initiating food administration. This assessment should include the state of consciousness and cognitive, posture and head control, observation of the oral mucosa and the entire cavity, nutritional status, time it takes to swallow saliva as soon as requested, observation of the respiratory cycle

and the phase in which it starts swallowing, cough effectiveness, palpating whether there is pharyngeal movement during swallowing and also the evaluation of the cranial nerves mentioned above [5].

2 Methodology

This systematic review was designed according to the protocol of Joanna Briggs Institute (JBI). The investigation question was formulated using the PICO(D) model as a research strategy, as shown in Table 1.

Table 1. PICO(D) model.

P	Population	People with deglutition disorders
I	Intervention	Rehabilitation nursing interventions
C	Comparator	Interventions vs lack of intervention
O	Outcomes	Resolution of the deglutition disorder
(D)	Design of study	Quantitatives and qualitative study's

Thus, the investigation question is: What are the interventions of the rehabilitation nurses for people with deglutition disorder? To answer this question, we searched on EBSCOHost database and proceeded to identify the health descriptors, extracting them from the Medical Subjects Heading (MeSH) vocabular, so our search was: ["Deglutition Disorders" OR Dysphagia] AND "Rehabilitation Nursing" AND "Interventions". Only the studies written between 2018 and 2020, written in english, portuguese or spanish, and that were about people with deglutition disorders and with more than 18 years old were included in this review.

The search was realized in May 2022 and were found 123 articles on EBSCOHost database, as shown in Fig. 1.

3 Results

A total of 8 articles were included, you can see the aim and results/conclusions of each study in Table 2.

There were different interventions described by different studies, so they are described in Table 3 to show the different approaches that we found for managing deglutition disorders. In the systematic reviews we used the resume that the authors did in their studies to show the interventions that they were analyzing.

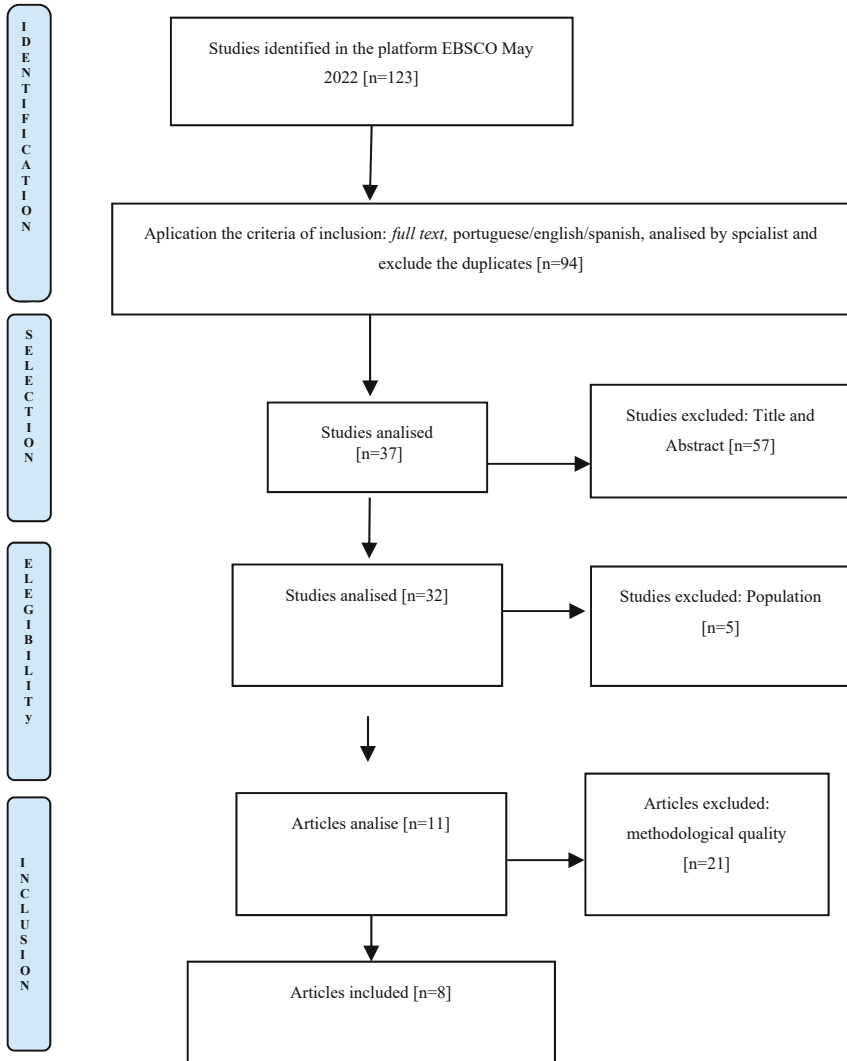


Fig. 1. PRISMA

Table 2. Results of the systematic review

Title/Country/Year/Authors/Methodology/Participants	Objectives	Results/Conclusions
<p>Title: Effects of oral neuromuscular training on swallowing dysfunction among older people in intermediate care – a cluster randomized, controlled trial</p> <p>Country: Sweden</p> <p>Year: 2019</p> <p>Authors: Hägglund et al</p> <p>Methodology: Cluster randomized controlled trial</p> <p>Participants: 116 older people with swallowing dysfunction</p>	<p>To determine the Effect of oral neuromuscular training among older people in intermediate care with impaired swallowing</p>	<p>At the end of intervention 31% of the intervention group gained normal swallowing rate compared to 12% in the control group, and the intervention group showed 60% higher swallowing rate compared to the control group</p> <p>The intervention group showed a reduction on signs of aspiration compared to the control group</p>
<p>Title: Effect of dysphagia rehabilitation in patients receiving enteral nutrition at home nursing care: A retrospective cohort study</p> <p>Country: Japan</p> <p>Year: 2020</p> <p>Authors: Furuya et al</p> <p>Methodology: Retrospective cohort study</p> <p>Participants: 116 patients aged ≥ 65 years receiving home nursing care and not eating by mouth because of dysphagia</p>	<p>To consider the effect of dysphagia rehabilitation in the resumption of oral intake in elderly patients receiving home nursing care</p>	<p>6 people switched completely to oral intake and 24 people were tube supplemented but had consistent oral intake</p> <p>The benefits of dysphagia rehabilitation included a lower risk of hospital admission, an improved quality of life and a lower mortality</p>

(continued)

Table 2. (continued)

Title/Country/Year/Authors/Methodology/Participants	Objetives	Results/Conclusions
<p>Title: Rehabilitation nursing intervention can improve dysphagia and quality of life for patients undergoing radiotherapy for esophageal cancer</p> <p>Country: China</p> <p>Year: 2021</p> <p>Authors: Zeng et al</p> <p>Methodology: randomized control trial</p> <p>Participants: 109 patients with esophageal cancer undergoing radiotherapy</p>	<p>To seek the improvement of rehabilitation nursing intervention on dysphagia and quality of life of patients with esophageal cancer undergoing radiotherapy</p>	<p>The effective rate of improving swallowing function in the intervention group was 82,8% compared to 57,8% on the control group</p> <p>The degree of mucosal injury in the intervention group was lower</p> <p>The intervention also increased the self-care ability and the quality of life of the intervention group compared to the control group</p>
<p>Title: Effects of a swallowing and oral intervention for patients following endotracheal extubation: a pre- and post-intervention study</p> <p>Country: China</p> <p>Year: 2019</p> <p>Authors: Wu et al</p> <p>Methodology: pre- and post- intervention study</p> <p>Participants: 117 patients in the control group and 54 patients in the intervention group. All patients were ≥ 50 years old</p>	<p>To test the effects of a swallowing and oral care intervention on patient's time to resume oral intake and salivary flow following endotracheal extubation</p>	<p>The intervention group took less time to resume oral intake, although 45,6% of the patients did not resume to oral intake in 21 days</p> <p>This intervention increased the odds of the patients of resuming total oral intake</p> <p>The salivary flow was increased in patients receiving the intervention</p>

(continued)

Table 2. (continued)

Title/Country/Year/Authors/Methodology/Participants	Objetives	Results/Conclusions
<p>Title: Treatment of dysphagia in Parkinson's Disease: A systematic review</p> <p>Country: Spain</p> <p>Year: 2020</p> <p>Authors: López-Liria et al</p> <p>Methodology: Systematic review</p>	To describe treatments for dysphagia in Parkinson's Disease patients	The rehabilitative therapies demonstrated an improvement of the swallowing function, a lower risk of choking an aspiration and an improval of the oropharyngeal function. All interventions showed an improvement of the degenerative function and quality of life
<p>Title: Effect of the Mendelsohn maneuver and swallowing training in patients with senile vascular dementia complicated with dysphagia</p> <p>Country: China</p> <p>Year: 2021</p> <p>Authors: Zhang</p> <p>Methodology: randomized control trial</p> <p>Participants: 214 patients with senile vascular dementia and swallowing dysfunction</p>	To investigate the Effect of Mendelsohn maneuver and swallowing training in patients with senile vascular dementia complicated with dysphagia	The patients in the intervention group had a significantly higher swallowing function than the control group, after the intervention The capability for activities of daily living was higher in the intervention group
<p>Title: Interventions for oropharyngeal dysphagia in acute and critical care: a systematic review and meta-analysis</p> <p>Country: United Kingdom</p> <p>Year: 2020</p> <p>Authors: Duncan et al</p> <p>Methodology: systematic review and meta-analysis</p> <p>Participants: 22 studies testing 9 interventions and representing 1700 patients</p>	To determine the effectiveness of dysphagia interventions compared to standard care in improving oral intake and reducing aspiration for adults in acute and critical care	Swallowing treatment showed no evidence of a difference in the time to return to oral intake or in aspiration following treatment. Swallowing treatment showed evidence of a reduced risk of pneumonia but no evidence of a difference in swallowing quality of life scores

(continued)

Table 2. (continued)

Title/Country/Year/Authors/Methodology/Participants	Objetives	Results/Conclusions
Title: Review of prophylactic swallowing interventions for head and neck cancer Country: China Year: 2021 Authors: Yang et al Methodology: systematic review	To establish evidence for the efficacy of prophylactic swallowing interventions in reducing aspiration and restoring oral intake in patients with head and neck cancer with dysphagia	Preventive swallowing interventions may be effective at reducing aspiration, improving swallowing function, and restoring oral intake

Table 3. Interventions described

Arcticle	Intervention Group	Control Group
Hägglund et al. (2019)	Oral neuromuscular training of orofacial and pharyngeal muscles using a device that was placed on the mouth and pulled for 5 to 10 s. It was performed for 3 times with a 3 s rest between each one	Usual care with adjustments in food consistencies and posture instructions
Furuya et al. (2020)	Oral care Oral motor exercises without food 30 min per day Postural adjustments	No control group
Zeng et al. (2021)	Mouth opening exercises Neck massage Oral organ coordination training Direct feeding training Swallowing therapeutic apparatus with frequency of 30–80 Hz for 30 min once a day for 2 weeks	Nursing measures according to the routine nursing process of esophageal cancer

(continued)

Table 3. (continued)

Article	Intervention Group	Control Group
Wu et al. (2019)	Toothbrushing/salivary gland massage Oral motor exercise (purse the lips, move the tongue, open the mouth widely and inflate the cheeks for 3/5/10 repetitions with or without resistance) Range of motion exercises for the lips, tongue, jaw and cheeks Safe-swallowing education	Standard hospital care provided by ICU physicians and nurses
López-Liria et al. (2020)	Changing the texture of the diet Expiratory muscle strength training Neuromuscular electrical stimulation Oral motor exercises Video-assisted swallowing therapy Surface electrical stimulation Thermal stimulation Touch Chewing gum effect	No control group
Zhang et al. (2021)	The treatment provided in the control group plus: The Mendelson maneuver training daily for 10 min Swallowing training with a spoon of food increasing up to 15 ml. For 30 min twice daily for one month	Basic treatment according to the guidelines for the diagnosis and treatment of Dementia in China Neck exercises such as forward flexion, backward flexion, left rotation, right rotation and side flexion Open and close mouth Puff out the cheeks Sucking movements 30 min a day 5 times per week

(continued)

Table 3. (continued)

Article	Intervention Group	Control Group
Duncan et al. (2020)	Transcranial magnetic stimulation Transcranial direct current stimulation Tongue palate resistance Respiratory muscle strength training Pharyngeal electrical stimulation Neuromuscular electrical stimulation Chin tuck against resistance Acupuncture Behavioural intervention Effortful swallow training and traditional swallowing exercises	No control group
Yang et al. (2021)	Prophylactic swallowing interventions Tongue training programs: effortfull swallow, tongue strengthening and resistance exercises, tongue hold maneuver, Masako and tongue retraction Jaw training programmes: mouth opening and range of jaw movement and strengthening exercises Laryngeal elevation/upper oesophageal sphincter opening training programs: Mendelsohn exercises, shaker exercises, chin-tuck against resistance training and effortful pitch glides Airway closure training program: super supraglottic swallow	No control group

4 Discussion

The findings in this article showed that there are many different interventions regarding the rehabilitation in deglutition disorders. We can divide them in four types: postural and behavioural interventions; oral motor exercises; swallowing training; and current stimulation interventions. The last ones are not usually performed by nurses in Portugal so we don't find it as important to address them in this study.

Postural and Behavioural Interventions

For Furuya et al. (2020) the postural and behavioural interventions that were most important to perform during their intervention were the posture of the head and body and also the assessment of the various textures of food tolerated by the patients, having to explain to them the most recommended types of food. In addition, the authors also addressed the importance of a good oral care regarding a safer oral intake and for the rehabilitation of the structures in the oral cavity [8].

There were two authors that referred massage as an intervention to improve deglutition function, in one side we have Zeng et al. (2021) who showed the importance of neck massage for proprioceptive stimulation and in the other hand we have the study of Wu et al. (2019) that manifested the value of salivary gland massage for the promotion of saliva production. The existence of saliva is indispensable for the formation of the food bolus and this massage ends up stimulating all the sensory receptors in the oral cavity improving proprioception and sensorimotor control [9, 10].

Also, a good oral hygiene is an important part of nursing and rehabilitation interventions because it promotes a moist and clean oral cavity, allowing the lips, tongue, and jaw to move freely, benefiting swallowing function [8, 10].

An excellent intervention to reduce the risk of aspiration, as said by López-Liria et al. (2020), is the expiratory muscle strength training as it promotes an improvement of voluntary coughing, allowing a safe response when there is a passage of liquids or food through the vocal cords [11].

Oral Motor Exercises

Häglund et al. (2019) indicated that exercise-based training of the oral and pharyngeal muscles would strengthen the muscular structures and allow improvements in the swallowing rate. The authors also pointed out that in older people it is necessary to keep the training at least once a week for maintaining the strength and size of the muscles, although they could not prove that it affected the aspiration incidence [12].

The Furuya et al. (2020) study also proved that the oral motor exercises were essential to improve the swallowing function and showed that people who have been fed by tube can as well improve to oral intake by undergoing deglutition rehabilitation, but for this to happen the most important factor is the improvement of swallowing function [8].

Regarding radiotherapy patients, it was shown by Zeng et al. (2021), that the interventions realised, not only improved the swallowing function of the patients but also, diminished the degree of mucosal injury and complications respecting to the treatment, and an improvement of self-care ability and quality of life [9].

The exercise of tongue retraction improved the propulsion of the bolus by improving the contact of the tongue base pharyngeal posterior wall. Also, the range of tongue movement and strengthening exercises strengthened the tongue force and reduced the pharyngeal residues and risk of aspiration. And the tongue resistance exercises increased the force of hyoid bone to move upward and forward [13].

Swallowing Training

Swallowing Training was realised with only saliva and in some cases with solids. This training allowed patients to practise the swallowing movements and contract the muscles of the mouth and throat improving their strength and showing positive results after a continued daily program in the resume to oral intake or the swallowing rate function, as so it improves the coordination of all the muscles [14].

The Mendelsohn maneuver was tested by Zhang et al. (2021) associated with swallowing training and demonstrated an improvement of swallowing function of patients undergoing this rehabilitation program, as so it strengthens the pharyngeal muscles improving the pharyngeal phase initiation. Also, it allows patients to feel the lifting of the prominentia laryngea inducing the laryngeal reflex. Yang et al. (2021) also addressed this maneuver and showed that it increased the amplitude and duration of laryngeal elevation helping food to pass [13, 14].

The Effortful swallow exercised permitted the increasing of tongue pressure on the hard palate and pharyngeal wall helping to remove pharyngeal residues and diminishing the risk of aspiration of these residues [11, 13].

The Masako maneuver increased the activity of tongue extrinsic muscles but also increased the contractile force of the pharyngeal constrictors negatively affecting the movement of the hyoid bone. In the other hand the Shaker exercise and the Chin tuck against resistance exercise benefits the movement of the hyoid bone, the lifting of the larynx and the opening of oesophageal sphincter opening [13].

Even though we found these positive results on deglutition disorders with the practice of rehabilitation nursing programmes, there was one study, the one by Duncan et al. (2020), that didn't find any relevant difference between the patients who had rehabilitation care and those with standard care [15].

Although there are distinct types of interventions, most studies present in this systematic review don't evaluate the effectiveness of only one intervention at a time, that makes it hard to determine which ones are the most effective and that show the best results. We can affirm that deglutition rehabilitation has presented some positive results by improving swallowing function, diminishing the risk of aspiration, and improving quality of life, but we have no comparison between all these specific interventions.

As we didn't specify the typology of the deglutition disorder, we have articles about different diseases or different sources of alterations of the deglutition structures, as so it's difficult to determine which approaches are the best ones for each disorder.

Effectively, the rehabilitation is very important when involves actively participating the people, until they are able to fully meet their needs, and/or find compensatory mechanisms to do so, with the rehabilitation nurse specialist being your guide in this process. It is also important to note that self-care training is one of the health outcomes of Rehabilitation Nursing Care [16]. This review makes a contribution to this care.

5 Conclusions

Scientific evidence demonstrates that when swallowing is compromised, rehabilitation programs can help reduce episodes of aspiration. This prevention of complications is based on reinforcing compensatory swallowing techniques, making this process safer. The use of rehabilitation techniques in impaired swallowing allows improving self-care in terms of nutrition, as it promotes the maintenance of adequate nutrition and hydration. Therefore, in the rehabilitation of people with impaired swallowing, functional disorders are the alterations that most deserve attention. In addition to assessing motor impairment, the patient's cognitive and sensory abilities should also be assessed, as they may influence the rehabilitation process.

Effectively, interventions should be planned and started as early as possible, from a multidisciplinary perspective, thus preventing possible complications and optimizing recovery. This research made it possible to perceive the effectiveness of rehabilitation in specific swallowing disorders, defining the most appropriate treatment to produce more positive results for the patient. This type of study makes it possible to develop knowledge that demonstrates the role of rehabilitation and the family in this entire recovery process of the patient with swallowing impairment, as well as practices based on evidence.

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Intervention of the Rehabilitation Nurse in the Promotion of Self-care in People with Respiratory Alterations and Their Caregiver at Home

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Abstract. Background: Respiratory diseases are a public health problem. They have relevant repercussions on the person's functionality, autonomy and quality of life, by compromising their well-being and self-care. It is necessary to provide individualized care by the Rehabilitation Nursing Specialist Nurse, promoting interventions aimed at functional empowerment in self-care, preventing complications. It is essential to identify the indicators that can translate the excellence and quality of this care, in accordance with the instruments of support for the exercise of Rehabilitation Nursing, issued by the Portuguese Order of Nurses. **Objective:** To systematize Rehabilitation Nursing interventions promoting self-care in people with respiratory disorders and their caregivers at home, which promote healthy gains and demonstrate results that are sensitive to Rehabilitation Nursing care. **Methodology:** A systematic literature review was conducted by searching the scientific platform EBSCO host (MEDLINE Complete, CINAHL Complete and MedicLatina) using the PCC (Scoping review) method, and seven articles were selected. **Results:** Thirty nursing interventions were identified in the studies analyzed as promoting self-care in patients with respiratory disorders and their caregivers. Related to the components of a Respiratory Rehabilitation Program, such as respiratory and physical exercise training and health education, as well as with the inclusion of the caregiver in the care process. **Conclusions:** The Rehabilitation Nurse promotes self-care in people with respiratory alterations and their caregivers, by providing care with interventions framed within the Portuguese Order of Nurses quality standards. Nursing care sensitive results were observed, related to positive indicators, with health gains in terms of maximizing functionality, empowerment, symptom control, prevention of complications, well-being, and quality of life.

Keywords: Rehabilitation Nursing · Nursing Interventions · Self-Care · Caregiver · Respiratory Rehabilitation

1 Introduction

It can be seen that, in general, average life expectancy has been increasing with the inherent aging of the population [1]. However, longer average life expectancy does not mean that we live in better health, and there is a high rate of multimorbidity in older adults [2]. Diseases such as respiratory diseases, until recently considered terminal, have become chronic diseases [1].

Thus, healthy aging should not only be living without disease, but creating conditions of autonomy and functioning that promote quality of life for each individual throughout the life cycle. The development of functioning should be the basis for nursing interventions aimed at promoting the health of the population, particularly the older adults. Changes in functioning imply, in themselves, a change in self-care, taking it as an ability to function well and take responsibility for health care, as a need for people to incorporate a set of behaviors and activities that promote physical and mental balance, and as a need for effective support from family members, friends, and caregivers, as preponderant resources [3].

According to Orem [4], self-care is the “acquired, complex ability to meet the demands of continuing self-care... of human structure and functioning, as well as its development and promotion of well-being” (p. 254). Fonseca’s Self-Care Model [3], based on Orem’s self-care model [4] and supported by the continuum of functioning/disability proposed by the World Health Organization [WHO] International Classification of Functioning [5], includes the intervention of nursing care in maintaining autonomy and promoting re-adaptation processes, with regard to the already mentioned deficits in self-care and participation activities.

Specifically, respiratory diseases represent a serious public health problem, an important cause of mortality and morbidity, with high economic costs to the Portuguese health system. The ONDR [1] states that respiratory diseases have been the 3rd leading cause of death in men and women since 2015, with pneumonia standing out as the main cause, and also representing the main reason for hospital admissions, followed by Chronic Obstructive Pulmonary Disease (COPD). According to the National Institute of Statistics [6], there was an increase of 3.8% in deaths from respiratory disease in Portugal in 2018, and in the mainland and the autonomous regions the mortality rate from these diseases is among the highest in Europe, exceeding 115 per 100,000 inhabitants.

Chronic diseases, such as respiratory diseases, tend to drag on over time. With aggravations, with no return to the initial situation and, with the expected accumulation of harmful effects at the emotional and physical level. This often results from the effects of the “dyspnea spiral”, associated with physical deconditioning due to inactivity resulting from dyspnea [7], which leads to dependence and impairment in self-care, both of the person and the family involved/informal caregiver (IC). These people, who have difficulties in managing the disease process and achieving full autonomy, are often found within the family, and it is necessary not only to intervene with the individual, but also with his/her family or other caregivers [8].

It is, therefore, important to consider the concept of IC in this whole process; “informal caregivers are people who care for another person in a situation of chronic illness, disability, and/or partial or total dependence, either temporarily or permanently... Who are assumed as the primary responsible for the organization, assistance, and/or provision

of care” [9, p.s.]. Given this concept, it is easy to understand that caring for a person in a home setting inherently requires attention and care to the caregiver as well, ultimately, even to help him/her become a competent and capable caregiver [10].

Thus, Rehabilitation Nursing (RN) represents an area of specialized intervention of excellence, with several fields of action, preventing, recovering and rehabilitating people with disabilities, activity limitation and participation restriction, victims of sudden illness or decompensating of chronic disease, which cause functional deficit. It aims to promote the adequate re-adaptation and social reintegration of the people targeted for care, developing their capabilities, promoting their socialization, dignity and citizenship exercise [11].

In this sense, the Respiratory Rehabilitation (RR), as a global and multidisciplinary intervention program, represents one of the most urgent areas of intervention, for which the Rehabilitation Nursing Specialist Nurse (RNSN) is trained, and has an important role [12], promoting the best professional practices to control respiratory diseases that bring relevant repercussions in the person’s autonomy and quality of life, either in acute or chronic situation, in community/domiciliary context [7, 13]. Respiratory Rehabilitation Program (RRP) are essentially conceived with the purpose of treating people with respiratory disease and associated symptoms [14], which has repercussions on quality of life, conditioning physical, psychosocial and financial impact on the person, the family and society in general [14, 15]. In addition, the application of Technological Respiratory Rehabilitation regarding the self-care of the person with COPD, are an important adjunct to the intervention of the RRP [16].

It is important to note that, despite the greater scientific evidence of the benefits of using RRP in patients with COPD, it should be applied across the board to people with other chronic respiratory diseases, since there is a wide range of clinical entities for which it can bring proven benefits [12]. It is therefore important to better explore the benefits of its application to people with respiratory disorders, in a broader way [12].

A RRP includes a global assessment of the person and the application of individualized therapies, including respiratory re-education techniques, exercise training, education, and psychosocial support for the person and his/her IC, aimed at self-management of the disease and replacement of risk behaviors by health-promoting behaviors so that the person with dependence is in a position to take care of him/herself or at least to determine his/her will, for the improvement of autonomy [12, 13].

In line with this individualization of care and respect for autonomy, the provision of care by the RNSN is governed by principles such as humanity, freedom and the dignity of the person in the pursuit of excellence of professional practice, as a guiding premise of the activity and as a goal of quality [17]. According to WHO [18], quality improvement advocates the promotion and structuring of health care, the effective use of material, human and financial resources, and the excellence/competence of care by professionals to meet the needs of individuals.

Donabedian [19] develops a conceptual framework to assess the impact of organizational structure and professional practice on the quality of care, through which three indicators emerge: structure, process and outcome. It is based on this conceptual framework that the Order of Nurses ON [20] builds a Core of Indicators guided by the Descriptive Statements of the Quality Standards of RN Care, as a way to achieve a high

level of quality and excellence of professional practice and highlight the need to critically assess the results of practices aiming at their improvement.

To perform this necessary assessment, health indicators emerge as a way to translate the contribution of specialized nursing care to health as quantitative and qualitative variables that show the changes associated with the implementation of one or a set of interventions, allowing for the assessment of the quality and the measurement of interventions, thus producing nursing care-sensitive results [20, 21]. This care is directed to the needs of the person or group, considering their health determinants and their impact on variables such as functional status, self-care, symptom control, safety/adverse events, patient satisfaction, or other relevant variables [22], to which, in turn, the ON corresponds with the core indicators by category of descriptive statement [20].

From this necessary systematization of knowledge the present systematic literature review (SLR) was developed. It was determined as a starting question: "Which RN interventions promote self-care, regarding the person with respiratory alterations and his/her caregiver, in a home setting?" Our objective is to systematize nursing interventions that promote self-care in patients with respiratory disorders and their caregivers, at home, and that promote health gains, sensitive to RN care.

2 Methodology

A SLR was performed by analyzing articles and determining relationships between concepts, results, and conclusions, according to a starting question [23]. The Joanna Briggs Institute (JBI) was considered, opting for a scoping review [24], to analyze the extent and nature of research activity, in order to map areas of study where it is difficult to visualize the type of information that may be available [25]. We used a systematized and reproducible research process in order to decrease the risk of bias. The scoping review considers multiple sources of evidence to address the main question, so we used primary studies of various designs and an SLR with meta-analysis.

In line with the methodology used, the starting question was elaborated in PCC format [24]: Which Rehabilitation Nursing interventions promote self-care (Concept), regarding the person with respiratory alterations and his/her caregiver (Population), in a home setting (Context)?

An English language search was performed in the EBSCO host database (CINAHL complete, MEDLINE complete and MedicLatina) in February 2021, with the following descriptors extracted from the Medical Subjects Heading (MeSH) vocabulary: [(nursing) or (child care) or (nursing intervention)] AND [(rehabilitation) or (nursing rehabilitation) or (quality of life)] AND [(airway diseases) or (respiratory therapy) or (respiratory rehabilitation) or (dyspnea) or (lung diseases) AND [(caregivers) or (self-care)].

3 Results

A total of 286 articles were identified. After screening regarding articles published in the last five years, available in full text, written in Portuguese, Spanish or English, analyzed by a specialist and not duplicated in the databases, 22 articles resulted. Two independent reviewers read the title, abstract, methodology, results, and conclusion, and

applied inclusion criteria such as: including adults and older adults with respiratory disorders in home settings, mentioning the caregiver and nursing interventions related to the promotion of self-care. And exclusion criteria such as: articles with ambiguous methodology and no answer to the original question.

As can be seen in the Prisma 2020 Flow Diagram [26] (Fig. 1) seven articles were selected and critically appraised according to Melnyk and Fineout-Overholt's criteria [27]. Of these, one article has level of evidence I (systematic reviews or meta-analysis) [28], three articles have level of evidence II (well-designed randomized controlled trials) [28–30]; one article has level of evidence IV (cohort and case-control studies) [32], and two articles have level of evidence VI (single descriptive or qualitative studies) [33, 34].

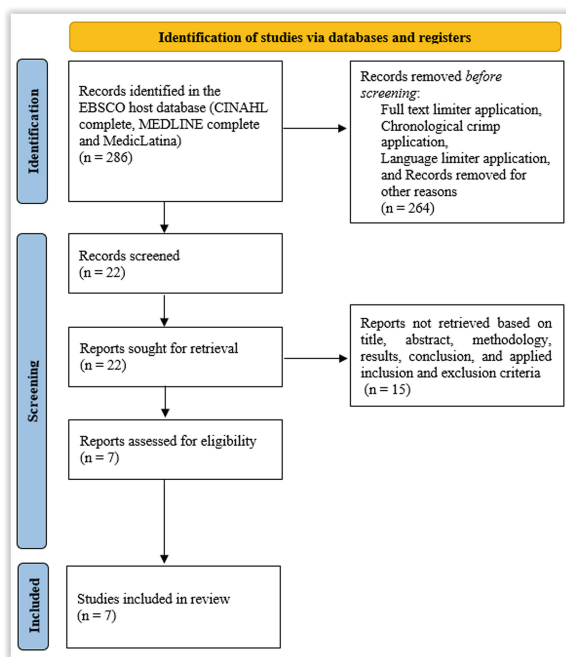


Fig. 1. Research methodology developed through the Prisma 2020 Flow Diagram

In order to systematize the RN interventions that promote self-care identified in the articles under analysis, whose application results are translated into indicators sensitive to RN care, and which, in turn, integrate the core indicators per descriptive statement category of the Quality Standards for Specialized Rehabilitation Nursing Care (QSSRNC) [20], the list of interventions (Table 1) and Table 2 were prepared, which shows the relationship between identified interventions, outcome variables, and descriptive statement categories.

Table 1. List of Interventions: Self-care-promoting interventions identified/Source articles

Self-care-promoting interventions identified/Source articles
1- Inclusion of the informal caregiver/family in the care process [28-34];
2- Identify needs and expectations of the person and/or informal caregiver (individualization of care) [28-31, 33,34]
3- Provide psychosocial support [29,30,33];
4- Assistance to the person/informal caregiver, by developing practical skills, stress and anxiety management [28-34];
5- Satisfaction level evaluation [29,30,32,34];
6- Assessment of anxiety levels [29,33];
7- Identification of needs in the scope of self-management [28-34];
8- Evaluation of physiological functions and vital parameters [28,29,31];
9- Respiratory function evaluation [28-31];
10- Promotion of the person's functionality [28-34];
11- Health-related quality of life assessment [28-31,33];
12- Health education on pathophysiology, self-management strategies, risk factors (smoking cessation), therapeutic management, and lifestyle [28-30,32,34];
13- Nutrition Education [29-32];
14- PRR application and training of respiratory muscles [28-32,34];
15- Application of endurance exercise and muscle strengthening plans [28-30,32,34];
16- Development of exacerbation treatment and dyspnea relief action plans [28,29,32];
17- Evaluation of progress in physical capacity/activity tolerance [28-30,34];
18- Health education on pharmacological and non-pharmacological strategies for symptom control and management [29,30,34];
19- Monitoring/assistance through structured follow-up system [28-32];
20- Education on the handling of therapeutic devices [28-32,34];
21- Multidisciplinary intervention and referral [28,29,31,33,34];
22- Professional qualification, specialized care [28-31,33,34];
23- Monitoring of the rate of recurrences to the emergency service/returns [28,30,32];
24- Monitoring the mortality rate [28];
25- Training and education on energy management strategies [29,32,34];
26- Evaluation of progress in physical ability/activity tolerance [28-30,34];
27- Interacting and sharing experiences with others [33]
28- Use for the educational process different methods and auxiliary means [28-32];
29- Collecting data and exploring the needs of healthcare professionals [34];
30- Continuous nursing record system [29,31].

4 Discussion

By analyzing Table 2, we can see the parallels between RN care, in accordance with the descriptive statements of the ON [20] and the different implicit variables proposed

Table 2. Relationship between descriptive statements of the QSSRNC, indicators and outcome variables and interventions identified in the different studies.

Categories of descriptive statements [20]/Related indicators	Outcome variables sensitive to RN care [22]/Related interventions
Customer satisfaction: person and caregiver satisfaction with RN care	<ul style="list-style-type: none"> – Professional/Personal Relationship: 1, 3, 8 – Satisfaction of the person: 1, 3, 5, 6, 8 – Psychological support: 1, 3–5, 7
Health Promotion: percentage of people to whom rehabilitation plan and/or program is applied to maximize functional capacities	<ul style="list-style-type: none"> – Functional state: 9–11, 18, 19 – Health literacy: 13–15, 20 – Physical Capacity: 9, 10, 15, 17, 19 – Symptom control: 15, 17–21
Prevention of complications: identification of risks of altered functionality and of the limitations and disabilities. Increased referral to other professionals of the multidisciplinary team, according to their social mandate	<ul style="list-style-type: none"> – Health literacy: 13–15, 22 – Symptom control: 15, 17, 18, 20, 21 – Protective Factors: 1, 5, 13, 14, 18, 20–24 – Psychological support: 1, 3, 5, 7 – Safety/adverse events: 18, 20, 21–25, 27 – Physical Capacity: 9, 10, 15, 17, 19
Wellness and self-care: increasing gains in knowledge and skills about techniques and devices that promote self-care (walking, getting ready, drinking, eating, toileting, dressing, transferring) and reduce the risk of changes in functionality	<ul style="list-style-type: none"> – Professional/Personal Relationship: 1, 3, 8 – Capacity building for self-care: 1, 5, 8, 13–15, 19, 20, 28 – Health literacy: 13–15, 20, 28 – Psychological support: 1, 3, 5 – Physical Capacity: 9, 10, 15, 17, 19
Functional Re-adaptation: increasing the maximization of the person's functional abilities through gains in knowledge and skills about ventilation aid device, self-monitoring of breathing pattern, breathing technique, positioning technique, resolution of ineffective ventilation, involvement of the person and informal caregiver in the care process	<ul style="list-style-type: none"> – Functional state: 10, 11, 18, 19, 28 – Symptom control: 15, 17–20, 28 – Safety/adverse events: 18–20, 22, 25 – Health literacy: 13–15, 20, 22 – Therapeutic adherence: 1, 13, 14, 18–20, 22, 28 – Physical Capacity: 10, 15, 17, 19

(continued)

Table 2. (continued)

Categories of descriptive statements [20]/Related indicators	Outcome variables sensitive to RN care [22]/Related interventions
<p>Functional Reeducation: increased identification of specific needs in the field of functionality and psychosocial aspects that interfere in the adaptive processes and health/illness transition. Increase of rehabilitation strategies that promote the maximization of functional and adaptive capacities, promotion of gains in knowledge and capacities about breathing techniques, coughing, ineffective expectoration, airway clearance, energy adaptation and conservation techniques, exercise habits, activity intolerance. Promotion of quality of life, reintegration and participation in society</p>	<ul style="list-style-type: none"> – Functional Status: 9–11, 18, 19, 28 – Psychological support: 1, 3–5 – Symptom control: 15, 17–20, 28 – Capacity building for self-care: 1, 3–5, 8, 11, 13–15, 17–20, 22, 28, 30, 31 – Therapeutic adherence: 1, 3–5, 8, 13, 14, 18–20, 22, 28, 30, 31 – Health literacy: 13–15, 20, 28, 30, 31 – Physical Capacity: 9, 10, 15, 17, 19 – Quality of Life: 1, 4, 5, 8, 11–15, 17–20, 22, 28
<p>Promoting Social Inclusion: increased optimization of the person, family and community resources for inclusion. Increase the involvement of the person and family in strategies promoting inclusion</p>	<ul style="list-style-type: none"> – Protective Factors: 1, 4, 5, 13, 22, 23 – Professional/Personal Relationship: 1, 3–5, 7 – Health literacy: 12 – Capacity building for self-care: 1, 3–5, 8, 13 – Quality of Life: 1, 4, 5, 8, 12, 13
<p>Organization of Rehabilitation nursing care: promotion of quality-promoting organizational methodologies. Increase in registries that incorporate outcomes sensitive to RN care. Increasing the proportion of clients with RN care</p>	<ul style="list-style-type: none"> – Safety/adverse events: 23–25, 27, 32, 33 – Use of health services: 23–25, 32, 33 – Human Resources: 23, 24, 32

by Doran and Pringle [22], influenced by organizational issues, and by experience and level of knowledge.

The results will be discussed in light of Fonseca’s Self-Care Model [3] based on Orem’s Theory of Self-Care [4], highlighting its relevance in the nursing professional practice. Thus, considering their heterogeneity, the 30 identified interventions promote, directly or indirectly, self-care in order to contribute to the empowerment of the person with respiratory disorders and his/her caregiver to take responsibility for the health care needed to maintain life, health and personal development [3].

The outcome variable that is most often related to the different indicators by category of descriptive statement is health literacy, since it is listed in the gains in knowledge and skills inherent to most of the indicators proposed by the ON [20], and it is also one of those that encompasses, due to its size and significance, a considerable number of interventions identified in different articles, directly related to health education as an integral part of a RRP [28–32], or indirectly related to it, in order to find out from people

with respiratory disorders, informal caregivers, and health professionals what their needs are in this area. In this sense, the study conducted by Fotokian et. al [34], identified health education among the older adults with COPD and health professionals as one of the main categories that they value in the empowerment process. The study by Farquhar et al. [29] corroborates this, identifying the same significance on the part of caregivers as well.

In the variable, health literacy, the focus on interventions such as promoting the acquisition of knowledge about pathophysiology, self-management strategies, risk factors such as smoking, therapeutic and lifestyle management [28–30, 32, 34, 38, 39], pharmacological and non-pharmacological symptom control and management strategies [29, 30, 34] is thus recognized. The latter intervention relates the variable, health literacy, to the variable of symptom control, such as dyspnea. It is recognized as a “target” variable, indispensable as part of an action plan to treat exacerbation and relief of dyspnea [28, 29, 32]. This, in turn, contributes as a protective factor and a safety variable/adverse events, included in the largest dimension of the category of descriptive statements of the ON concerning the prevention of complications [20], in order to prescribe interventions to reduce the risk of changes in functionality, as shown, for example, in the study by Albà and Puig-Gros [32], where a positive behavioral change was demonstrated after the educational intervention by nurses, culminating in an increase in the number of people vaccinated with the pneumococcal vaccine.

By the analysis of Table 2 and according to statements such as health promotion, re-adaptation and functional re-education, it is possible to verify the variable improvement of the functional state resulting from RRP intervention plans, with positive results from interventions such as the assessment of respiratory function [28–31] and progress in physical capacity and activity tolerance [28–30, 34]. This is due to the fact that RRP include individualized interventions such as respiratory muscle training [28–32, 34] and the application of endurance exercise and muscle strengthening plans [28–30, 32, 34]. It is even recognized by Wang et al. [30] that the inclusion of physical exercise in a RRP directly conditions the positive outcome in terms of quality of life, as has been found.

The benefits achieved by the application of RRP, with its educational and exercise training component, represent an improvement in the ability of the person with respiratory disorders to assume the role of self-care agent¹, thus, all these interventions work as promoters of empowerment for self-care and self-management and can be identified in all studies. According to Orem [4], when the ability for self-care is compromised, the intervention of a self-care agent is necessary, which can be informal (family/caregiver) or professional (nurse).

Thus, the inclusion of the informal caregiver/family in the care process is one of the interventions identified in all studies [28–34]. Attesting to its importance, the study by Albà and Puig-Gros [32] found that in terms of the variable therapeutic adherence, there were better results both in the inhaler use test and in the knowledge tests in people who were accompanied to the sessions by caregivers. The qualitative study conducted by Farquhar et. al [33] inferred that the opinion of informal caregivers for the development of an educational and empowerment plan for the person with shortness of breath is essential

¹ Self-care agent, as the person who performs the activities, with the ability to take responsibility for health care, incorporating a set of behaviors and activities that promote physical and mental balance [3,4].

and promotes self-care ability, although it is recognized by the caregivers themselves that their needs and role are often neglected. The same study infers that, for caregivers, knowledge gains would not only help them to better support the patient, but would also help them to manage their own frustrations, anxieties, and quality of life.

These findings are reinforced by the results of a descriptive study conducted in Italy by Ivziku, Clari, Piredda, Marinis, and Matarese [35], which found a direct correlation between caregivers' anxiety and depression symptoms and negative results in their mental quality of life and in the "physical" quality of life of the people with COPD for whom they care. It is in this sense that it is important to consider nursing interventions against variables such as the person's satisfaction and psychological support, such as the identification of the person's/IC's needs and expectations [28–31, 33, 34, 36, 37], the provision of psychosocial support [29–31, 34], the assessment of anxiety [29, 33] and satisfaction levels [29, 30, 32, 34], as promoters of indicators related to the descriptive statement, client satisfaction [20], as observed in the studies that included them.

As can be seen in By the analysis of Table 2, the categories of descriptive statements of the quality standards that include the largest number of interventions promoting self-care and which, in turn, have greater representation in the different articles are, in increasing order, functional rehabilitation, prevention of complications and functional re-education. The functional re-education, by the ON [20], is precisely one of the categories of descriptive statement, specific to the RNSN. Through the positive results, at the level of outcomes such as quality of life [28–31, 33], customer satisfaction [29, 30, 32, 34], use of health services, particularly through the monitoring of the rates of recurrence to the emergency service/readmissions [28, 30, 32], it is proven that these are interventions that produce gains in health sensitive to the care of RN, thus constituting as indispensable in contributing to relevant indicators and monitoring priority.

The literature review with meta-analysis conducted by Yang et al. [28] to assess the impact of continuity of care and nursing interventions after hospital discharge showed a reduction in readmissions of people with COPD. Thus, in line with the results of this review, we found that interventions such as continuous monitoring/assistance to the person and informal caregiver, at home, through structured follow-up systems based on telephone contacts, home visits [28–31], telemonitoring [28] and computerized platforms [29, 31], identified in several articles, have shown positive results in several areas, showed positive results in several indicators, namely, reduction in emergency department visits and readmissions [30, 32], improved physical capacity [29–31] and functional status [30, 31], increased therapeutic adherence [29, 31, 32], reduced anxiety levels [29], increased satisfaction [30, 32], and quality of life [29–31].

It is observed that, in accordance with the statement of the organization of RN care, the use of methodologies that promote quality, namely multidisciplinary intervention and referral, as identified in some studies [28, 29, 31, 33, 34], the implementation of interventions that promote self-care considering professional qualification and specialized care (highlighted in most studies), provided to the largest possible number of people who need them, will translate into health gains, in the search for excellence in the nursing professional practice and in the pursuit of continuous quality improvement [20].

It should be noted that the eight categories of descriptive statements proposed by the ON [20] are identifiable in all articles. Many of the interventions are transversal

to the different outcome variables sensitive to nursing care, since interventions are not limited to a single variable, nor do the latter serve, by themselves, a single dimension. Similarly, there are variables that are sensitive to nursing care, and, therefore, promoters of indicators that translate health gains, which are common to the different descriptive statements of the quality standards of RN care, serving as a basis.

Thus, models of care must take all variables into account and promote person-centered care to meet individual goals in order to achieve health gains.

5 Conclusion

This review highlights the relevance of considering anxiety and depression in people with respiratory disorders and caregivers, as a result of dealing with physical dependence and changes in functioning, which affect the active participation in family and social life.

The caregiver's involvement in the person's rehabilitation process, mentioned in all the studies analyzed, reveals his/her importance as a partner in the organization, assistance and provision of care, thus an intervention strategy that considers the needs and expectations of informal caregivers is necessary. Thus, self-care becomes a complex and multidimensional phenomenon [3].

The results found in this review allow for the identification of RN interventions that promote self-care in the genesis of nursing-sensitive indicators, and that people with respiratory disorders and their caregivers achieve health gains with these interventions. Thirty interventions were identified, among which those related to RRP, in its component of respiratory and physical exercise training, but mainly in its component of health education by bridging the gap with several variables of Doran and Pringle [22], stand out. This, in turn, puts them in line with the largest dimension of the categories of descriptive statements of the ON [20], functional re-education, which is, as already mentioned, the one with the highest expression in the studies analyzed. This result is in line with the competences of the RNSN, provided by the ON [11], in the sense of empowering the person with altered functionality, maximizing it through the promotion of self-care, prevention of complications and increase of capacities, contributing to their re-adaptation, reintegration, well-being and quality of life.

We found, as a limitation, the small number of research studies published in this area, specifically on people with respiratory disorders other than COPD and their caregivers. Therefore, in order to create more and better evidence and promote outcome-oriented practice that is sensitive to nursing care, it is important to conduct more specific studies in this area.

It is worth emphasizing the importance of establishing a professional practice of RN, sustained by the parallelism between the different components of the Donabedian model [8], the variables involved as studied by Doran and Pringle [22] and the premises of quality, considered in the core indicators of the ON [20], given their inter-connection and the fact that they contribute together for the systematized evaluation of care and for the production of indicators sensitive to RN care, promoters of continuous improvement of the quality of health care.

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The Rehabilitation Nurse and the Empowerment of Older Adults with Mobility Impairment and Self-care Deficits: A Systematic Literature Review

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Abstract. Background: The increase in the elderly population and life expectancy brings new challenges to RNs. The promotion and empowerment of these people for self-care is an added value in the search for well-being and quality of life, where the RN can intervene effectively.

Objective: Identify which RN interventions for empowering the elderly person with mobility impairment and self-care deficit.

Methodology: SLR by searching RCTs using the EBSCO Host - Research Databases platform, including the following databases: Academic Search Complete; Business Source Complete; CINAHL Plus with Full Text; Cochrane; ERIC; Library, Information Science & Technology Abstracts; MedicLatina; MEDLINE with Full Text; Nursing & Allied Health Collection: Comprehensive; Psychology and Behavioral Sciences Collection; Regional Business News; SPORTDiscus with Full Text; Teacher Reference Center in the period between 2016 and 2022.

Results: A total of 12 studies were found that demonstrate functional gains in the elderly with mobility impairment as a result of rehabilitation interventions or caregiver involvement in the rehabilitation process.

Conclusion: The implementation of a functional re-education plan can be effective in promoting functionality and empowering the elderly for self-care. RN interventions comprise conventional therapeutic exercise training, the application of functional electrical stimulation and neuromuscular bands, and the implementation of new technologies in rehabilitation. The caregiver can incorporate the re-education plan without endangering the person.

Keywords: Self-care · Mobility impairment · Rehabilitation Nursing · Aged

1 Introduction

Aging is characterized as a continuous, dynamic and progressive process of biopsychosocial changes that affect the health status, the level of dependence and autonomy of

human beings [1]. The World Health Organization (WHO) defines elderly as any individual aged 60 years or more, however, in more developed countries, an individual aged 65 years or more is considered elderly [2–4], including the situation of the population in Portugal [5].

Data from the 2021 Census of the National Institute of Statistics in Portugal reveal that the age group of people aged 65 or older registered a population increase [6], representing 22.1% of the Portuguese population in 2020 [7]. In the 2019–2021 triennium life expectancy at age 65 was estimated for the total Portuguese population to be 19.35 years [8].

However, as people get older, there is an increase in morbidity and disability caused by diseases and injuries, most of which are chronic, with impact on self-care and, consequently, on quality of life [9–11].

Data from 2019 reveal that 52.5% of the Portuguese population has difficulties satisfying the Activities of Daily Living (ADLs) and Instrumental Life Activities, compared to 49.7% in the European Union [12].

According to the Regulation of the Specific Competences of the Specialist Nurse in Rehabilitation Nursing [13] in force in Portugal, the Rehabilitation Nurse (RN) develops a functional re-education plan aimed at improving residual functions, maintaining or regaining independence in ADLs, and minimizing the impact of installed disabilities, with a focus on empowering the person and maximizing their functionality.

Given the characteristics of the Portuguese population and the RN's skills, there was a need to identify RN interventions for empowering the elderly with mobility impairment and a self-care deficit via this systematic literature review (SLR) of randomized controlled trials (RCT).

2 Methodology

This SLR followed the Joanna Briggs Institute (JBI) guidelines [14] and employed the PICO[D] method in formulating the research question, as follows: P - Persons aged 65 or older with mobility impairment; I - Empowerment; C - Self-care deficit; O - RN interventions; D - Randomized controlled trials. The research question “What are the RN interventions for the empowerment of older people with mobility impairment and self-care deficit?” emerged.

During the period of July 2022 a search was conducted on the EBSCO Host - Research Databases platform, selecting the following databases: Academic Search Complete; Business Source Complete; CINAHL Plus with Full Text; Cochrane Central Register of Controlled Trials; Cochrane Clinical Answers; Cochrane Database of Systematic Reviews; Cochrane Methodology Register; eBook Collection (EBSCOhost); eBook University Press Collection (EBSCOhost); ERIC; Library, Information Science & Technology Abstracts; MedicLatina; MEDLINE with Full Text; Nursing & Allied Health Collection: Comprehensive; Psychology and Behavioral Sciences Collection; Regional Business News; SPORTDiscus with Full Text; Teacher Reference Center.

We used the MeSH (Medical Subject Heading) and CINAHL validated descriptors “elderly”, “empowerment”, “mobility”, “randomized control trial”, “rehabilitation nurse” and “self-care deficit”, using the Boolean “AND” and “OR”, resulting in

the Boolean phrase [(elderly) AND (mobility) AND (self-care deficit)] AND [(rehabilitation nurs*) OR (nurs*) AND (intervention or program) OR (rehabilitation) OR (empowerment)] AND [(randomi?ed control* trial*) OR (randomi?ed clinical trial*)].

The inclusion criteria were randomized controlled studies with full text available, in English, published between 2016 and 2022, and that answered the research question. The studies should show functional gains in the elderly person resulting from rehabilitation interventions in inpatient or outpatient settings, or from the involvement of caregivers in the rehabilitation process.

Figure 1 systematizes the methodological path of the research developed through the Prisma Flow Diagram [15].

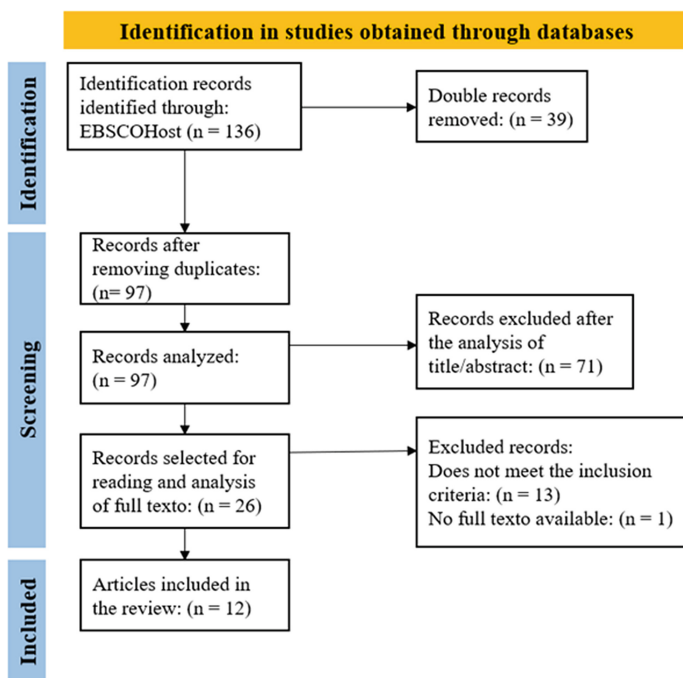


Fig. 1. Prisma Flow Diagram research methodology [15].

The search resulted in a total of 136 articles, which after the elimination of duplicate results resulted in 97 articles for title and abstract analysis. After this analysis 71 articles were eliminated whose theme or methodology did not fit the intended outcome or whose results did not show positive outcomes in this area of intervention, resulting in 26 articles for full text analysis. From this analysis we obtained a total of 12 articles to be included in this review, whose methodological quality assessment [16] and levels of evidence of JBI Critical Appraisal Tools [17] meet more than 50% of the proposed quality criteria. All articles were reviewed by two authors.

This SLR is registered in PROSPERO with ID CRD42022365894.

3 Results

After the process of search, selection and validation of the studies found, a set of 12 articles was obtained, whose data were extracted and presented in Table 1. All results correspond to RCT, level of evidence 1.c [17].

4 Discussion

The loss of functionality that older people may suffer during or after periods of hospitalization may not only result in loss of independence in ADLs and decreased quality of life, but may also affect the rehabilitation process itself [18–21].

The introduction of a rehabilitation program, as early as possible, through a multidisciplinary team where the RN is included, is extremely important for older people with mobility impairment and self-care deficit, and has been proven by several authors [20–22], namely in two SLRs [20, 21], coexisting gains for individuals, family members and the community.

4.1 Conventional Exercises and Electrical Stimulation

The study by Lee et al. [23] asserts that in people with hemiplegia due to stroke, trunk stability training with selective activation of the abdominal muscles has beneficial effects on abdominal muscles, balance, and mobility. The results of this study are corroborated by other authors [24–27].

The use of electrical stimulation has also been tested. In the rehabilitation of people with foot drop due to stroke, Sharif et al. [28] proved that gait training with functional electrical stimulation produces greater gains in mobility, balance, gait performance and reduction of spasticity, when compared to muscular electrical stimulation. There are more studies solidifying the gains from the use of electrical stimulation, such as the study by Tan et al. [29] that demonstrates the efficacy of gait training and the study by Stein et al. [30] that validates the use of neuromuscular electrical stimulation in improving specificity and range of motion in people with stroke. On the other hand, Fossat et al. [31] point out that electrical stimulation of the quadriceps muscles, associated with early exercise practice with a cycloergometer and standardized rehabilitation, does not show benefits when compared to standardized rehabilitation practice alone.

The RSL conducted by Martínez-Velilla et al. [20] advocates that people should initiate short periods of walking while still in hospital, using auxiliary devices, which is corroborated by the study of Gazineo et al. [32], concluding that, in hospitalized people, an individualized assisted walking program improves the ability to walk at discharge.

In a study by Dong et al. [33], a strategy to increase activity levels in the older population with mobility impairment, namely after stroke, leading to a promotion of their functional independence, is the use of accelerometers during gait, recording the activity performed. The feedback from this instrument can serve as a stimulus (maintain activity, promote motivation and increase self-efficacy). Peel et al. [34] validated that providing participants and professionals with daily accelerometer walking times leads to an increase in average daily walking time. In contrast, in the study by Atkins et al.

Table 1. Identification of the analyzed articles

Title/Authors	Objectives	Results/Conclusions
Title: “Promoting Activity in Geriatric Rehabilitation: A Randomized Controlled Trial of Accelerometry” Authors: Peel et al. (2016)	Determining whether activity levels increase with the sharing of activity monitoring data, for individuals and professionals, in the context of setting explicit goals	Making the accelerometer walking times available daily to participants and professionals increases the average daily walking time
Title: “Video and computer-based interactive exercises are safe and improve task specific balance in geriatric and neurological rehabilitation: a randomised trial” Authors: Van Den Berg et al. (2016)	To test the feasibility and safety of using interactive computer/video rehabilitation exercises in improving mobility in the geriatric population, or those with neurological disorders	The addition of interactive video/computer-based exercises to geriatric and neurological rehabilitation of hospitalized persons induces task-specific improvements in balance, but not in overall mobility
Title: “The effects of a high-intensity functional exercise group on clinical outcomes in hospitalised older adults: an assessor-blinded, randomised controlled trial” Authors: Raymond et al. (2017)	Evaluating a high-intensity functional exercise group in hospitalized elderly	High-intensity functional exercise in groups contributes to greater professional efficiency, but produces effects similar to individual physical therapy alone
Title: “Effectiveness of Functional Electrical Stimulation (FES) versus Conventional Electrical Stimulation in Gait Rehabilitation of Patients with Stroke” Authors: Sharif et al. (2017)	To compare the efficacy of functional electrical stimulation versus muscular electrical stimulation on gait in people with foot drop due to stroke	Gait training with functional electrical stimulation is more effective than electrical muscle stimulation in improving mobility, balance, gait performance, and reducing spasticity
Title: “Hemianopia after stroke: A randomized controlled trial of the effectiveness of a standardized versus an individualized rehabilitation program, on scanning ability whilst walking” Authors: Crotty et al. (2018)	Comparing the effectiveness of a standardized program versus individualized therapy in people with homonymous hemianopsia	A standardized intervention using NVT and mobility training improves quality of life compared to individualized therapy

(continued)

Table 1. (continued)

Title/Authors	Objectives	Results/Conclusions
<p>Title: “Use of a robotic walking aid in rehabilitation to reduce fear of falling is feasible and acceptable from the end user’s perspective: A randomised comparative study”</p> <p>Authors: Piau et al. (2019)</p>	<p>To determine the acceptability and feasibility of using a robotic walking aid to support the work of rehabilitation professionals in reducing the fear of falling in older people with ‘psychomotor maladaptation’ (the most severe form of post-fall syndrome)</p>	<p>The use of a robotic walking aid is feasible and accepted by participants and professionals</p>
<p>Title: “Feasibility of a Nurse-Trained, Family Member-Delivered Rehabilitation Model for Disabled Stroke Patients in Rural Chongqing, China”</p> <p>Authors: Chu et al. (2020)</p>	<p>To evaluate the feasibility of implementing a new nurse-led rehabilitation model to empower family caregivers of stroke patients in their rehabilitation process</p>	<p>The new rehabilitation model improved the person’s physical recovery without increasing the burden on the caregiver</p>
<p>Title: “The effectiveness of Kinesio Taping® for mobility and functioning improvement in knee osteoarthritis: a randomized, double-blind, controlled trial”</p> <p>Authors: Donec e Kubilius (2020)</p>	<p>To evaluate the effectiveness of the Kinesio Taping® method for improving mobility and functionality in people with knee osteoarthritis</p>	<p>The use of Kinesio Taping® attenuated the symptoms and increased mobility in a subjective evaluation of the participants. However, it did not show results in mobility and functionality</p>
<p>Title: “Digitally enabled aged care and neurological rehabilitation to enhance outcomes with Activity and MObility UsiNg Technology (AMOUNT) in Australia: A randomised controlled trial”</p> <p>Authors: Hassett et al. (2020)</p>	<p>Evaluate a personalized prescription of accessible digital devices, in addition to usual care, for people with mobility limitations admitted to geriatric and neurological rehabilitation units</p>	<p>The use of virtual reality video games, activity monitors, and handheld computer devices improves mobility and physical activity</p>

(continued)

Table 1. (continued)

Title/Authors	Objectives	Results/Conclusions
Title: “Effect of trunk stabilization exercise on abdominal muscle thickness, balance and gait abilities of patients with hemiplegic stroke: A randomized controlled trial” Authors: Lee et al. (2020)	To evaluate the effectiveness of core muscle contraction training on abdominal muscle thickness, balance and gait in stroke patients	The conventional therapeutic exercise program helps to improve gait and balance, and the trunk stability exercises promote a change in the thickness of the abdominal muscles, which translates into an improvement at the functional level and in the ability to control the trunk
Title: “Effects of a multicomponent high intensity exercise program on physical function and health related quality of life in older adults with or at risk of mobility disability after discharge from hospital: a randomised controlled trial” Authors: Sunde et al. (2020)	To evaluate the effects of a group-based, high-intensity, multi-component exercise program on physical function and quality of life in older adults with or at risk for mobility impairment after hospital discharge	A group exercise program significantly improves functional capacity and quality of life in older adults with or at risk for mobility impairment after hospital discharge
Title: “Assisted Walking Program on Walking Ability in In-Hospital Geriatric Patients: A Randomized Trial” Authors: Gazineo et al. (2021)	To evaluate whether the use of an individualized assisted walking program for hospitalized elderly people contributes to improved walking ability, compared to usual geriatric care and rehabilitation	The use of an individualized assisted walking program improves walking ability at discharge

Legend: IG – Intervention group; CG – Control Group

[35], when testing the pedometer as a motivational tool, they concluded that it does not improve functional mobility if no goals are set, although an increase in daily time in the orthostatic position was observed.

Raymond et al. [36] state that high intensity functional exercise in conjunction with individual physiotherapy sessions produces a similar effect to individual physiotherapy alone, with the benefit that group physiotherapy sessions result in greater practitioner efficiency, as they save 31 to 205 min per week. This is consistent with research by Sunde et al. [37], who found that a group exercise program led by a rehabilitation professional significantly improves functional capacity and quality of life compared with a home exercise program in older adults with, or at risk for, mobility impairment.

4.2 Application of Neuromuscular Taping

In the field of rehabilitation of the person with musculoskeletal changes, Donec and Kubilius [38] evaluated the effectiveness of neuromuscular bands (Kinesio Taping®). The intervention did not produce better results in mobility and functional improvement, compared to nonspecific knee banding. However, it did have better results on a subjective, participant-reported assessment for symptom alleviation and increased mobility experienced. The intervention had already been tested by other authors who achieved a similar result [39–41].

Also, Donec and Kriščiūnas [42] stated that the use of neuromuscular bands may be beneficial in reducing postoperative pain and edema, improving knee joint extension, in the early postoperative rehabilitation period of total knee arthroplasty.

In an RSL with a meta-analysis of ERC performed by Wang et al. [43], the use of the Kinesio Taping® method demonstrated benefits in lower limb rehabilitation of people with stroke, significantly improving spasticity, motor function, balance, gait ability and quality, and ADLs. However, the authors suggest further studies to identify the benefits of neuromuscular taping, due to the limited number of articles selected and the quality of the research performed.

4.3 New Technologies

The study by van den Berg et al. [44] proved that the addition of interactive video/computer-based exercises to geriatric and neurological rehabilitation of hospitalized persons induces task-specific improvements in balance, but not in mobility in general. However, Cannell et al. [45] demonstrated no significant differences in stroke patients' rehabilitation with the use of virtual reality with gesture controlled interactive video and Li et al. [46] corroborated these results by demonstrating that the use of an app supported exercise program (mHealth) can facilitate supplemental exercise, but does not directly affect functionality outcomes compared to traditional rehabilitation programs.

Recently, Hassett et al. [47] implemented a study and contrary to previous studies, there was an improvement in mobility in the intervention group, but the time spent in the orthostatic position did not change.

Piau et al. [48] demonstrated the feasibility and acceptability of the use of a robotic walking aid (SafeWalker®), from the perspective of participants and professionals, in the context of older people with a severe fear of falling.

Homonymous hemianopia after stroke is equally impactful for independence and insertion in the community for the elderly population, some authors [49, 50] argue that these people have reduced independence and a lower quality of life when compared to people with other visual deficits [49].

Crotty et al. [49] proved that a standardized intervention using scanning techniques, using NVT scanning equipment, which allows training a set of visual enhancement techniques and mobility training, improves quality of life, when compared to usual individualized rehabilitation care.

4.4 Caregiver Involvement

Taking into account the limitations that rehabilitation units have to meet all the needs of the population, the importance of informal caregivers in the process of rehabilitation at home of older people, reaching out similar results in terms of effectiveness, freeing the elderly and their caregivers from traveling to rehabilitation units [51, 52].

Zhou et al. [53], found no benefit in caregiver empowerment as they tested a complex intervention in the rehabilitation of people with stroke that combined caregiver empowerment through a cell phone application with teachings/training during the hospital stay focusing on mobility and self-care. In parallel, Chu et al. [54], conducted another intervention study in stroke survivors focusing on mobility, self-care, and toilet use. This study concluded that the new rehabilitation model implemented by nurses and practiced by family members improved physical recovery, as evidenced by Barthel Index values, without increasing caregiver burden, compared to usual care.

Jarbandhan and his collaborators [55] certify this statement, proving that the rehabilitation care provided at home and through tele-rehabilitation, promotes better results in functional independence, when compared to general care. They also present a better cost-benefit ratio compared to rehabilitation care in hospital rehabilitation units.

5 Conclusion

The scientific evidence on the RN intervention for the empowerment of the elderly person with mobility impairment and self-care deficit is still limited. The need to develop evidence-based practice is urgent, and the consequent publication of these studies is an added value in the promotion and visibility of RN interventions within this theme.

From the analysis performed, all studies showed gains resulting from rehabilitation interventions in older people with mobility impairments, highlighting conventional exercises and electrical stimulation, neuromuscular banding, new technologies, and caregiver involvement in rehabilitation care.

To contribute to increasing the mobility and functionality of the elderly is to contribute to their empowerment for self-care, improvement of quality of life, relationships with family members, the community, and society in general.

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Informal Caregivers: Helping Those Who Help

Community Nursing Intervention Project: Digital Health Literacy in the Training of Informal Caregivers – Situation Diagnosis

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Abstract. The use of information and communication technologies to promote health literacy has become a working tool for health professionals during the pandemic caused by covid-19. Social isolation had a direct impact on involuntary caregivers, by taking more permanent care of their family members. Access to health information was partially restricted to telephone contact or digital means. The accomplishment of this work aims to present the diagnosis of the health situation of the community nursing intervention project, called: Digital Health Literacy in the Training of Indirect Caregivers. The methodology used was health planning, through the application of a data collection instrument, in the time-space from April 14 to June 30, 2021, to 24 informal caregivers of users enrolled in an integrated continuous care team of the Group of Health Centers Lisbon Norte. It was found that caregivers are mostly female, predominantly caring for people over 80 years of age. Half of the respondents are actively working. There is a weaker level of health literacy in the area of health promotion. In a situation where they do not know how to act, they request support from health professionals, and the search for videos is also referred to as a valid source of information. A better knowledge of the population about the accessibility of health information through digital technologies promotes healthy, preventive, and protective lifestyles. Nurses, as a promoter of better health of the population, play a major role in the training of groups and communities, through information and communication technologies.

Keywords: Health Literacy · Internet-Based Interventions · Caregiver · Diagnosis

1 Introduction

Health Literacy, defined by the World Health Organization (WHO), is defined as a set of cognitive and social skills that enable people to access, understand and use information, to promote and maintain good health [1]. From obtaining, processing, and properly understanding basic health information, citizens should be able to identify and adequately manage health risks [2].

Health systems face severe economic challenges to provide more and better health care, especially to those most in need. Around the world, the use of information and communication technologies (ICT) to support health services is constantly developing and expanding rapidly. It is an important resource for the delivery of health services due to its ease of use, wide reach, and wide acceptance [3].

The development of ICT must be based on principles of transparency, accessibility, replicability, interoperability, privacy, security, and confidentiality [4], promoting communication at the level of health promotion, universal access and digital training in health, giving opportunities to individuals to take greater care of their health [5].

The projections of the population residing in Portugal between 2018–2080, carried out by INE [6], reveal that the number of young people will decrease from 1.4 to around 1 million, and the population may decrease from 10.3 to 8.2 million.

In the last three decades, the aging rate in Portugal has gone from 68.1 to 182.1 elderly people per 100 young people, with an elderly dependency ratio from 20.5 to 36.8 elderly people per 100 people of working age [7]. According to the INE [6], the aging index could double, from 159 in 2018 to 300 elderly people in 2080. These values are a reflection of the decrease in the young population and the increase in the elderly population.

In Portugal, life expectancy at birth has been increasing, from 79.29 in 2008/2010 to 80.72 in 2019–2021, with a greater increase in women [8]. These values demonstrate the ever-increasing need for long-term care because although people can live longer, it does not mean they live healthier. In 2019, of the 19.6 years of life expectancy at age 65, 7.3 are healthy lives. [9].

The birth rate has been decreasing, families live further apart, and women spend less time at home as they are increasingly active in the labor market. Ensuring support for elderly or sick family members becomes increasingly difficult, reducing the availability of family members to become informal caregivers [10, 11].

The concept of informal caregiver (IC) refers to the spouse or de facto partner, relative, or affine up to the 4th degree of the straight line or collateral line of the person cared for, and within this universe, two types are defined of CI, the main and non-main. The main IC permanently accompanies and takes care of the person cared for, living with them in shared housing and not earning any remuneration for their professional activity or for the care they provide to the person being cared for. The non-main IC, monitors and takes care of the person cared for regularly, but not permanently, and may or may not earn remuneration for a professional activity or the care it provides to the person cared for [12, 13].

The use of ICT in Health has become increasingly important, as it is a means of ensuring that health information is provided correctly, to the right person, in a secure digital

format, optimizing the efficiency of healthcare delivery. Health, research, education, and knowledge, in the right place and time [14].

According to WHO, the use and promotion of digital health solutions can revolutionize the way people can acquire higher standards of health and new forms of access to promote and protect their health and well-being. Digital health supports equitable and universal access to health services, increasing the efficiency and sustainability of health systems, promoting their accessibility, and strengthening and increasing health promotion, and disease prevention, in a system that respects privacy and privacy. Security of each person's health information [4, 15, 16].

2 Methodology

The health planning methodology consists of a set of stages, starting with the diagnosis of the health situation of a population [17]. The situation diagnosis is an assessment made of the individual, family, or community, where the identification of health problems (real or potential) has as the main objective, defining nursing interventions to achieve expected results (Fig. 1) [18].

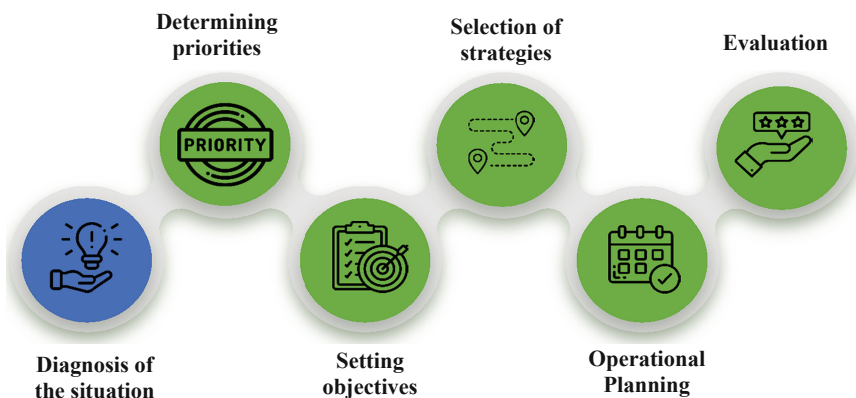


Fig. 1. Stages of health planning - Adapted from Tavares, A (1990).

According to the International Classification for Nursing Practice (CIPE) a community is a set of human beings, having in common the geographic location, conditions, or interests, creating a social unit, where the connections between these elements, do not constitute parts of the group, but the whole [19].

Rodrigues [20], defines health itself as the main objective of health planning, to contribute to improving the health of the population, knowing its available resources. Understanding the social context in which individuals live and work is extremely important in health promotion [21, 22]. It is at this stage that the main focuses of action are identified, according to the context in question. The carrying out of the situation diagnosis must be broad enough, to cover several areas, from the social to the economic

part, allowing greater coverage of the population's needs [23]. It is an extremely important stage in any intervention project, as it is in this stage that the areas most in need of problem-solving are identified, and often the problem that initially seemed most obvious to us is not always what we conclude. After analyzing the data.

The present work aims to present the diagnosis of the situation carried out to 24 Informal Caregivers of the users of a continuous care team (ECCI) of Aces Lisboa Norte (ACES LN), in an exploratory-descriptive study, based on the application of an instrument of data collection (ICD) called "Questionnaire on the profile of informal caregivers in the municipality of Lisbon", in the timeframe from April 14 to June 30, 2021, in a non-probabilistic convenience sample. According to Fortin [24], descriptive studies aim to characterize the phenomena, which may vary in complexity, with the application of a questionnaire being one of the data collection methods.

The project called "The Profile of Informal Caregivers in the municipality of Lisbon", developed by the Center for Research, Innovation, and Development in Nursing in Lisbon (CIDNUR), with ACES LN as a partner, was allowed after contact with the Scientific Coordinator of the project, use the ICD to carry out the diagnosis of the situation of my intervention project, this instrument being constituted by: questionnaire of sociodemographic characterization of the caregiver and the dependent person; Barthel index; Lawton and Brody Instrumental Activities of Daily Living Scale; Zarith Scale; Wellbeing Index; Depression Scale and Health Literacy Assessment Instrument: HLS-EU-Q. The application of the ICD took place during home visits by the ECCI multidisciplinary team, with the agreement of the informal caregiver, after delivery and explanation of the informed consent.

The questionnaires were applied in person to 14 informal caregivers and the remaining 10 caregivers by telephone. The face-to-face questionnaires were carried out during home visits carried out by the ECCI nursing team, and my presence and purpose had been previously clarified with the user, by the nurse in charge. The informed consent was read and signed by both, and a copy was given to the informal caregiver. In the telephone interviews, consent was verbally given to the ECCI nurse, in the previous contact made by the latter.

3 Results and Discussion

3.1 Results

According to Rodrigues [20], in the first stage of health planning, the situation diagnosis must contain the characterization of the target population, the characterization of health problems through health indicators, and the health needs of the population, where possible to intervene in the search for better health. This questionnaire was applied to 24 CIs residing in the Municipality of Lisbon, all of which provided care to only one dependent person. It was found that of the 24 informal caregivers, 79.1% were female and 20.8% were male, aged between 45 and 89 years, with the largest number of informal caregivers in the 50-year-old age group. 59 years old (Fig. 2).

The people cared for were aged between 21 and 96 years old, with 79.1% being over 80 years old. About 50% of the informal caregivers were direct descendants, 83.3% of

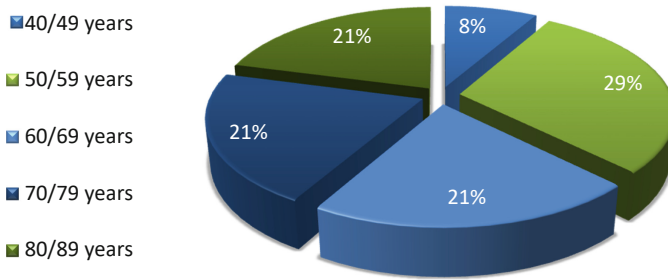


Fig. 2. Distribution by age group of Informal Caregivers (%).

whom were female (daughters). Of the remaining caregivers, 37.5% were spouses, 8.3% were parents (mothers), and 4.1% were second-line relatives (nephews).

Analyzing the level of education, it was found that 54% of informal caregivers had higher education compared to 16% who reported not knowing how to read or write. About 50% were actively working, 8% were unemployed and 42% were retired (Fig. 3).

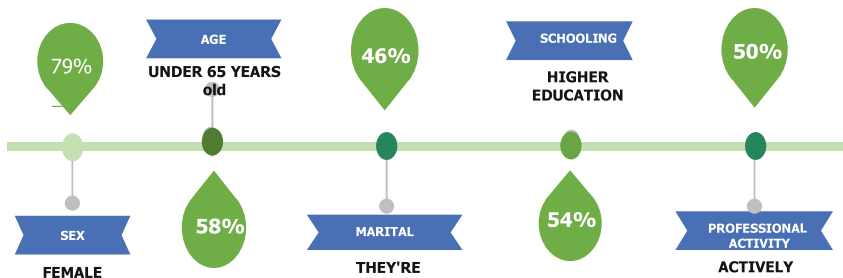


Fig. 3. Sociodemographic characterization of Informal Caregivers (%)

The main cause for the need for care was an illness, in 87%, with the diagnosis of stroke being the main pathology, followed by respiratory infection. Old age, without associated pathology, came up with 13% of responses.

Since 92% of ICs lived with the person they care for, assuming the role of IC was a gradual process for 58% of respondents, while for the rest it was sudden. Of the respondents, 22 informal caregivers lived with the person cared for (91.6%), verifying that 71% had taken care of the family member for less than a year.

Full-time care was provided by 58.3% of the ICs, with two ICs telecommuting. All respondents referred that the housing conditions in the context of providing care were adequate, with 70.8% referring to having good accessibility conditions to the house, although 16.6% referred to architectural barriers in the interior, due to the presence of narrow corridors or inaccessibility to the interior of the bathroom, in a wheelchair.

When asked about the need for help to care for the family member, 50% reported having enough help, 54.1% reported having professional support from social and private solidarity institutions, 45.8% reported having support from family members (children, husband, brother) and 25% reported not having any support.

One of the scales applied in the ICD was the Barthel scale, to assess the level of dependence in carrying out activities of daily living of the individuals being cared for, where a score of 0–20 suggests total dependence, 21–60 severe dependence, 61–90 dependence moderate and 91–99 mild dependence. After analyzing the data, it was found that 58.3% of the individuals cared for had total/severe dependence (Fig. 4).

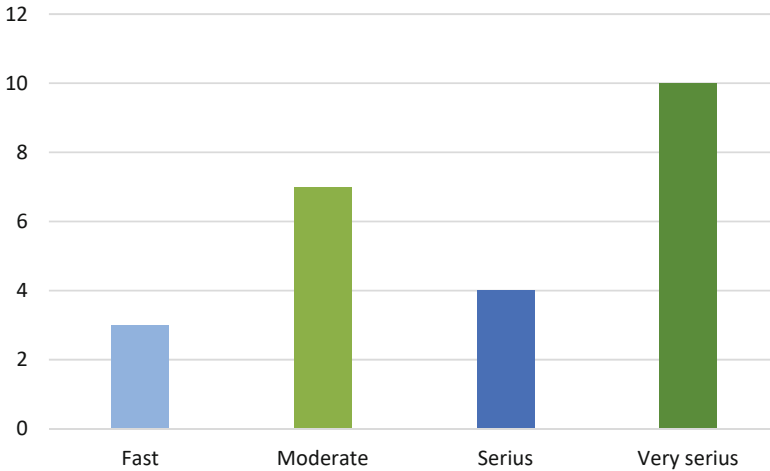


Fig. 4. Result of the degree of dependence of the individuals cared for, through the application of the Barthel scale

The Zarith Scale, as an instrument that allows measuring the level of perception that the IC has about the burden that caring for their family member exerts on their life, was also applied to the respondents. In the 22 questions on the scale (the scale ranges from 22 to 110), three levels of overload are identified: severe overload (56 to 110), overload (from 47 to 55), and no overload (22–46). It was found that 32% had severe overload, 13% had overload, and the remaining 54.1% had no overload.

The application of the scale of instrumental activities of daily living by Lawton and Brody, aims to assess the individual's autonomy in carrying out daily tasks, which can be dependent (worth 0 points for each answer) or independent (worth 1 point). The final score results from the sum of the 8 questions, where a score of 0–1 represents total dependence, 2–3 severe dependence, 4–5 moderate dependence, 6–7 slight dependence, and 8 independents. The application of the scale to the 24 individuals under care revealed that 62.5% were completely dependent (Fig. 5).

When questioned about the health resources that the community has, 45% reported knowing some, including using them, and of these 11 individuals, 63% knew health professionals and 36% through the internet and television.

To learn how to care for or clarify doubts, 4.1% refer to having resorted to leaflets, 20.8% resorted to videos, 37.5% resorted to health professionals, and 8.3% to family members linked to the health area. In a situation to which they do not know how to respond, 70.8% turn to health professionals, 20.8% to social workers, and 33.3%

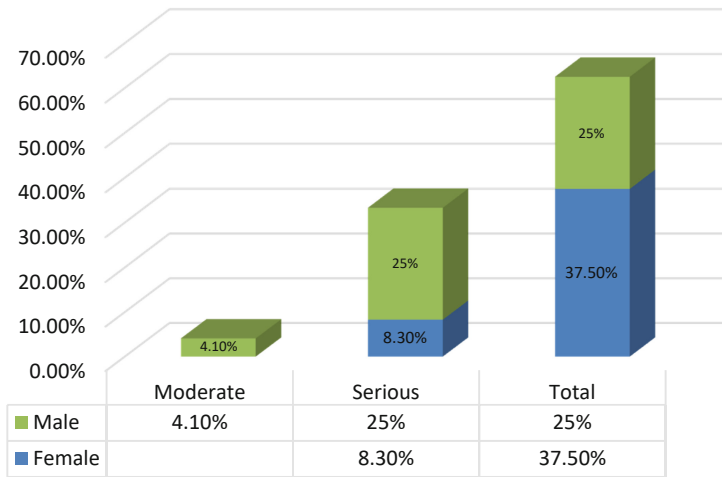


Fig. 5. Result of the application of the Lawton Index -Brody to people cared for by IC (number of individuals)

to family members, with only 4.1% resorting to digital communication technologies (Internet).

Of the support to which they are entitled as informal caregivers, 74% are unaware of them, while the rest were aware of them through television, the internet, family members, health professionals, and social workers. 37.5% of IC reported knowing the law that recognizes the status of informal caregivers through television, the internet, health professionals, and radio, knowing the procedure to be recognized as such. 29.1% of the IC were able to list some rights and duties towards the person being cared for, including providing medical care, providing emotional support, caring for the family member, and promoting comfort and safety.

Regarding questions regarding health literacy, through the Health Literacy assessment instrument, 3 dimensions were addressed: health care, disease prevention, and health promotion. Since half of the respondents have a university degree, we can see that they have excellent health literacy rates. In the area of health promotion, 8% of respondents did not answer the questions presented, 11% had an inadequate/problematic level of literacy, and 31% sufficient, the dimension of health promotion, which is the one that shows the lowest level of literacy, comparatively to the dimension of literacy about disease prevention and health care (Fig. 6).

After assessing the respondents, through the analysis of the data collected from the data collection instrument, it was possible to identify health problems and define interventions in nursing. According to the ICNP taxonomy [19], the following nursing diagnoses were defined: impaired health-seeking; compromised social support, compromised caregiver role performance, and risk of caregiver stress (Fig. 7).

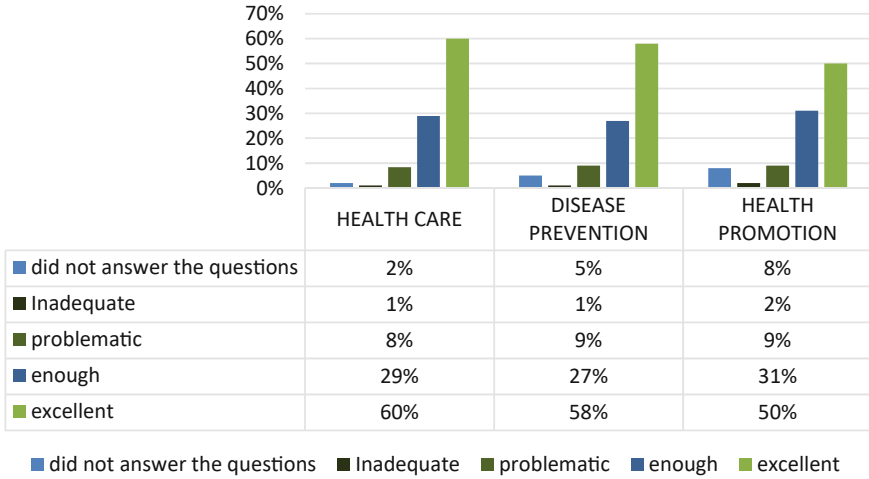


Fig. 6. Levels of health literacy of the 24 informal caregivers surveyed regarding the dimensions of health care, disease prevention and health promotion. Presented in %.

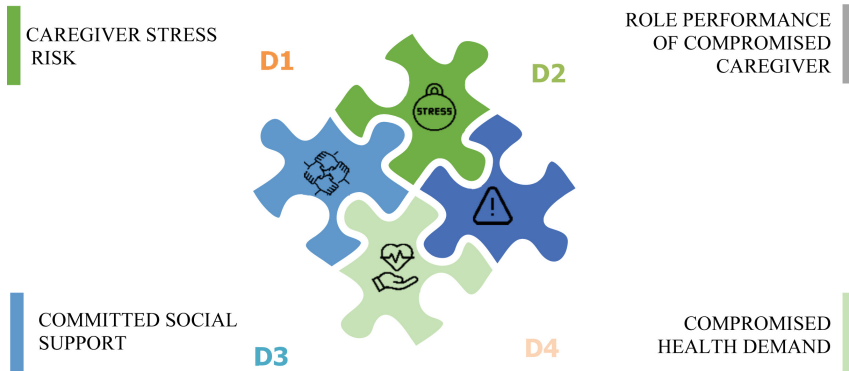


Fig. 7. Nursing diagnoses, according to ICNP language.

3.2 Discussion

After analyzing the ICD data, we can see that the data obtained are in line with the preliminary results of the project “The profile of Informal Caregivers of the Municipality of Lisbon”, and the data presented in this study characterizes informal caregivers as being mostly from the female, aged between 50–62 years, direct descendants, married and with higher education. More than two-thirds live with the dependent person and more than 60% do not know the status of the informal caregiver [25]. Carvalho [26], also characterizes the informal caregiver as being mostly female, with an average age of 56 years.

The need to take care of family members with a total dependency rate above 60%, allowed us to understand that 1/3 of the respondents refer to an intense burden when taking care of their family member, associated with a lack of knowledge of the resources

available in the community where they are inserted and a lack of knowledge of current legislation regarding the status of ICs. Carvalho mentions in his study that the people cared for are mostly in a situation of total or severe dependence on activities of daily living, which reinforces the intense burden felt by the informal caregiver [26].

According to a national survey carried out by the informal caregiver's movement [27], the main difficulties associated with the role of an informal caregiver are related to the emotional and psychological state, social support, financial difficulties, work, and related training and qualification of the informal caregiver. He mentions that the lack of time to take care of himself, the readaptation of routines, and the reduction of social life are the main difficulties in the informal caregiver's family reorganization.

Informal caregivers must know their rights, in our study, where 74% do not know the rights of informal caregivers, through the statute, in the study presented by the movement of informal caregivers [27], about 72, 8%. Not aware of the existence of this movement. These values reflect the search for compromised health of the informal caregiver, through the unfreezing of guidelines and support that he can request.

According to the study carried out in 2015 by the Calouste Gulbenkian Foundation in Portugal, through the project "Health Literacy in Portugal" [28], we can see that the sum of health literacy levels in the area of health promotion (sufficient and excellent) in a total of 48.9% are far below the 81% shown in Fig. 6, which can be explained due to the level of education, as this project states that 15.4% of respondents have higher education, contrasting with the 54% shown in Fig. 3.

In informal caregivers, low adherence to the use of information and communication technologies in health promotion was evidenced, demonstrating that the search with health professionals is the most used means for the search of problem-solving, which goes against To these results, the aforementioned study [28], refers that the Portuguese access information about health preferably through direct contact with health professionals, through television and reading leaflets, and the search for information through the internet is used less frequently. Technology and online platforms cannot replace the direct relationship with health professionals, but the development of tools that can provide caregivers with information in real-time can be essential to reduce the burden on caregivers, promoting their well-being [29].

4 Conclusion

The elaboration of a project in the health area only makes sense when it aims to satisfy a need identified in the population in question [18].

As the first moment of the health planning methodology [18], the diagnosis of the health situation of the ECCI's Informal Caregivers allowed measuring the health status of this population, making it possible, in the remaining stages of the process, to define priorities for action, organize activities, monitor and evaluate the results [26, 21].

Carrying out a diagnosis of the health situation aims to outline the health profile of a population, identify the health problems, and needs of this population, prioritize them and define the priority interventions to obtain potential gains in health [30, 31]. A health problem is an individual's perspective of their poor state of health, while a need represents what is necessary to move from the current state of health to the desired state of health [18].

According to Imperatori [17], the diagnosis of the situation must correspond to the health needs of the population and must be enlightening given the economic and social sector, allowing the identification of the main health problems and respective conditioning factors, to be able to explain the causes of the problems identified in a simple and easy to understand way. Based on this author, we can say that it is only possible to act on a health problem after defining the diagnosis because if there is no diagnosis made, there is a risk of, through personal impressions and comparisons with other places with the same characteristics, projecting what is judged to be a need, through the subjectivity of each one.

The application of the data collection instrument made available by the CIDNUR project “The Profile of Informal Caregivers of the municipality of Lisbon”, allowed me to know the population under study, their sociodemographic characteristics, and their health problems, allowing me to elaborate on nursing diagnoses, according to the ICNP.

The articulation with the entire ECCI nursing team allowed me to increase the probability of achieving the project’s objectives, as they facilitated its implementation, by allowing me to visit all the informal caregivers of the 24 users enrolled in home care.

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Public and Other Health Initiatives



Caring for Older Adults in Emergency Units: A Grounded Theory of the Nurse's Clinical Reasoning Process – NCRP

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Abstract. The emergency unit nurse's clinical reasoning requires high expertise, as it involves a wide range of specific knowledge and skills to perform a rigorous and quick assessment of information. Clinical reasoning allows nurses to prescribe the most relevant, coherent and appropriate intervention in a complex environment like the emergency unit. Older adults seek emergency units mostly due to sudden multimorbidity problems or illness, increasing nurses' responsibility to diagnose and prescribe care responses, safety and guarantee quality for needs and expectations. Objective: To explain the nurse's clinical reasoning process in the care of adults and older adults in a multivalent emergency unit. Participants: 20 nurses who worked in a multivalent emergency unit. Method: An inductive study using Grounded Theory. Data collection was performed through in-depth interviews and participant observation. Results: Nurses' particular process to assist older adults were named Nurses' Clinical Reasoning Process (NCRP), involving two sub-processes: The Assessment and Diagnostic Process (ADP) and the Nursing Therapeutic Intervention Process (NTIP). Nurses develop clinical reasoning in the emergency units based on assessment, diagnosis, prescriptions and therapeutic intervention, which they improve as the therapeutic nurse-client-family relationship is strengthened, and the process is developed intertwined and interdependently. The nurse's concerns are centred on the assessment (clinical situation, problems expressed, socialization), managing time and information, and promoting comfort and confidence in the care provided. Conclusion: emergency unit nurses' main purpose is to use their clinical reasoning process to meet the older adults' needs, and guarantee and improve health and the quality of health care provided.

Keywords: Clinical Reasoning Process · Caring · Nurses · Assessment · Older Adults · Emergency Unit

1 Introduction

Clinical reasoning is central to nurses' professional performance in the different contexts of care practice, whether they are improving literacy and promotion, prevention, treatment or rehabilitation. It is an integral part of the skills of nurses in the operationalization

of the nursing process, insofar as it allows the analysis of findings and the adaptation of interventions in a way directed to the needs of the older adults, contributing to health gains and healthy ageing [1, 2] clinical reasoning is a central phenomenon and confers benefits to the people cared [3–7].

Benner and colleagues (2009) report that nurses with effective CR skills have a positive impact on people's care, and on the contrary, nurses with immature clinical reasoning skills often fail to detect the deterioration of the person's clinical status on time. Critical thinking is essential for effective clinical reasoning, which is an intellectual process involving the ability to analyze, use and seek logical information, discriminate, apply standards, predict and transform knowledge. Thus, clinical reasoning is a cognition process to structure action, thus building the nurse's intervention continuously and dynamically, in a back-and-forth of evaluation and action [6]. This cognitive process becomes progressively more robust over time and is systematically being fed by new information or information resulting from implemented interventions, which are subjected to evaluation and analysis through critical thinking, clinical judgment and decision-making, in a process of uninterrupted evaluation and re-evaluation of results. At the same time, clinical experience is an *ex-libris* in this process, as it contributes to the improvement and adequacy of clinical reasoning in the act of caring for people in their life cycle [7].

Nurses, within the scope of their professional practice of training, relieving, comforting, helping, favouring, promoting, reestablishing, and restoring, always aim to achieve the highest level of quality of care for older adults and their families. Nursing care takes place in different contexts where it assumes its particularities, which require adaptability and a high level of proficiency [8, 9] constituting the emergency unit a particularly demanding context, due to its high complexity, variability and unexpected situations, some of which evolve rapidly [7, 10].

Multimorbidity and the overuse of emergency units are a worldwide concern, as it increases the need for visits to the emergency unit and conditions its response in the times considered appropriate, with a loss of effectiveness of human and material resources, in responding to people's critical care needs [10–14]. People aged 65 or over are major users of emergency units [15], which is why it is essential to know the strategies that nurses use in the context of critical care to minimize situations of fragility, control chronic diseases, improvement of functional capacity and prevention of cognitive decline and social interaction, to achieve "compression" of morbidity levels [16, 17].

We know that older age is not synonymous with illness, but it increases the likelihood of deterioration in physical and mental health [16]. Older adults seek emergency units due to sudden multimorbidity problems or illness, which triggers anxiety, fear and anguish primarily caused by uncertainty and unpredictability of the health problem and the lack of information. Also, sudden illness takes older adults out of their homes and family environment. This wider knowledge about these problems is a national and international concern that troubles everyone's responsibility. Therefore, each of us must develop individual or group mechanisms to straighten our actions towards more adequate older adults who seek an emergency unit response, answering to their expectations, both health professionals and of the emergency unit capacity response to their specific situations [7].

Due to the importance of nurses' clinical reasoning regarding older adults' care and benefits, as well as its complexity we aim to investigate the components involved (process and actions) and the nuances of emergency unit context to improve nurses' professional performance. Thus, it is in this sense that we choose to focus on the older adults caring in the emergency unit [7]. We believe that a better understanding of the clinical reasoning process of nurses who care for older adults in an emergency unit can add valuable knowledge to nursing practice.

So, we follow the research question: How does the emergency unit nurse's clinical reasoning process accomplish caring for an older adult person?

2 Method

2.1 Study Design

The study used an inductive approach and the Grounded Theory methodology [18, 19]. Grounded Theory (GT) is an inductive process of theory creation methodology from a particular perspective to gather and analyzing of empirical data to generate middle-range theory. It is a path to discover unobservable phenomena, carried out in "the real context" where the phenomenon occurs. In GT theory creation facts' explanations emerges from observation and interaction. The researcher's analytic focus emerges during the research process, rather than being determined before the empirical inquiry begins. Increasingly, grounded theorists assume that the method is a way of thinking about, constructing, and interacting with data throughout the research process. Charmaz's GT was selected considering fundamental aspects: 1) simultaneous performance of data collection and analysis; 2) analytical construction of codes and categories based on data and not based on preconceived hypotheses; 3) use of the constant comparison method, in all phases of the analysis; 4) theory development at each stage of data collection and analysis; 5) the writing of memos is essential to elaborate categories, specify their properties and determine the relations between categories; 6) the sampling should be theoretical, focused on theory construction, and not on representativeness; 7) the literature review after the development of the independent analysis. Because they are cyclical phases and it is necessary to intersect steps. The use of multiple sources of data (observations, interviews and memos) is crucial for triangulation, as it allows detection gaps through the divergence between the data, due to inconsistency, a singular way of expression, being, thinking and acting [18].

2.2 Participants and Setting

Participants were eleven ($n = 11$) females and nine ($n = 9$) males: Participants' mean age was thirty-six years ($M = 36.8$), ranging from 25 to 47 years. The mean of years in the profession was fourteen ($M = 14.9$); experience in the emergency unit was eleven years (11.3). Regarding professional training, ten (10) were registered nurses (RN) and ten (10) have a Master's degree. All participants signed informed consent and participated freely. Information about the study was provided. The study has clearance from the Ethics Committee Board ddo CHLC/CE/10-02-2016. Participants were recruited

process to follow the criteria: being an RN expert in the [20, 21] having at least 5 years of professional expertise in the EU; experience Working in all sectors of the EU, and being a motivated volunteer to participate in the study. For data collection, we used in-depth interviews and participant observation carried out with twenty (20) nurses who worked in multipurpose emergency units (EU) and notes/memo writing was recorded for six months in 2016.

2.3 Data Collection Techniques

The in-depth interview or unstructured [22] was used for data collection to explore RN experiences in their daily lives (behaviours, beliefs, interactions and ideas), and is the main method in qualitative research. All in-depth interviews took place in the same setting, duly chosen (a quiet, safe, and sheltered room with no chance of interruptions) to maintain a naturalist context and favour the participant's expression. Therefore all interviews occurred in a peaceful and comfortable environment for the participants, capturing the phenomenon through the language of the individuals who experience it.

Participant observation [23] is a research technique, in which an investigator (participant observer) studies the life of a group by sharing in its activities using memos. It has two main focuses: 1st, to observe the nurses' clinical reasoning - achieved through the constant observation of nursing interventions and capturing clinical reasoning situations; 2nd observe a single participant in a more individualized and focused way, at certain times and in specific contexts. These two phases made it possible to enhance and compare data collection through in-depth interviews. Observations were recorded in memos - descriptive notes (date, context, actors, interventions, time). Memos [23] enrich and add data details to further comparability with the data gathered from the interviews. It allows the capture of behaviours and emotions in a specific moment of participants' interaction. Thus, participant observation and memos were used to triangulate data and optimize the collection of in-depth interviews [19, 23].

The study context was a multipurpose emergency unit at a central hospital in the Lisbon area, selected according to being a multipurpose and public emergency unit; have a high number of calls daily; to have privileged and high number access to observations that show the clinical reasoning process of nurses.

3 Results

Data analysis, which emerged from in-depth interviews, participant observation and memos, shows that nurses to assist older adults in the emergency units, develop a particular process, which we named Nurses' Clinical Reasoning Process (NCRP). NCRP emerges based on Level I situations - the risk of life, and Level II situations - Expressed problems. The NCRP involves two sub-processes: The Assessment and Diagnostic Process (ADP) and the Nursing Therapeutic Intervention Process (NTIP). Likewise, the "act" of nurse care begins with the assessment and diagnostic process, and this process corresponds to the first phase, and only after that, the nurse's interventions conception is carried out to face the older adults' assessed needs. The more rigorous the first assessment (ADP) phase, the more accurate the interventions will be. In addition, we named

the moment immediately after the ADP as Nursing Therapeutic Intervention Process, which aims to respond to the identified needs. Nevertheless, it became clear that the primacy of ADP happens just in the first moment and only occurs in the first phase of nurse-patient interaction. From here on, the two processes (ADP and NTIP) always happen in a dynamic and intertwined way, however interdependent with each other. Figure 1 summarises the findings regarding the Nurse's Clinical Reasoning Process.

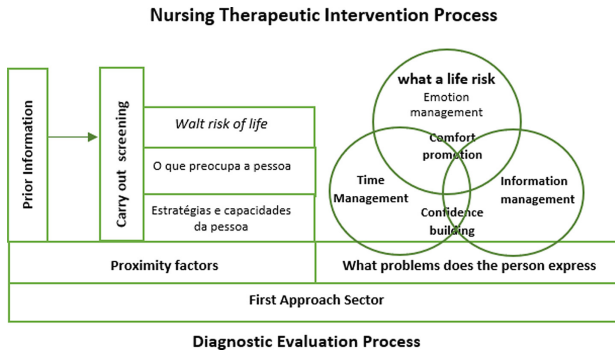


Fig. 1. Nurse's Clinical Reasoning Process - NCRP adapted from Mendonça, 2021, p. 155 [7]

4 Discussion

In the present study, we consider the concept of clinical reasoning in the emergency unit as a cognitive process carried out by the nurses from the first second of the nurse-patient interaction. In another word, it occurs as soon as nurses become aware of the person's existence, and this reasoning continues through data collection, analysis and information processing, in order to intervention conception and continuous decision-making. Has presented in Fig. 1 nurses' decision ability has two targets: decisions on the type of assessment; and decisions on the type of interventions, always ponder the emergencies or priorities to put them into practice immediately, and after this, nurses must think about and program the following evaluations and interventions. There is, nurses continuously evaluate patients' outcomes and act following new results and new information, thus, we are facing a dynamic and evolutionary process, in favour of solving the problems of older adults. The nurses' decisions taken also progress in complexity over time and as the interaction/relationship between the nurse-older adults settles down and evolves [6].

According to [7], for every person assisted in the emergency unit, the nurse acts according to priorities: First attend to older adults at risk of life, which we call Level I situations - the risk of life, and second line of action and priority, is Level II situations - Expressed problems, and these findings are in agreement with Lopes [24] and Sapeta [25], who also found that the assessment and nursing therapeutic intervention is a central foundation in nurses professional performance. It is given these two levels of priority that nurses develop their clinical reasoning to meet the needs of older adult people,

prioritizing situations in which the older adult person needs more urgent assistance. Since older adult people who are brought to the emergency department are not always at risk of life, their problems are not always framed in the true mission of the emergency unit, and it is difficult for emergency units to respond effectively [11, 26]. For example, older adults with chronic illnesses, in need of some surveillance and assistance, end up, wrongly, looking for emergency units. Therefore, nurses are also required to know how to act to resolve these situations that require them to have a clinical reasoning ability adapted to understanding the problems expressed by older adults and people who have multimorbidity or who come for other reasons. In this perspective, it is fundamental that the nurse can identify and sort out the true reasons for coming to emergency units. Therefore, nurses must implement a set of assessment and intervention items presented below in Fig. 1 [7]. In the first assessment, the nurse collects information regarding the severity of the clinical condition to establish a clinical priority, distinguishing right from the start whether the reason for the older adults coming to the emergency unit is a Level I or II situation. The assessment and interventions carried out by the nurse are registered in the computer program and can be checked and updated at any time [7]. This is the first assessment step that starts the nursing process of caring for older adults person. The nurse sometimes performs a diagnostic assessment, and sometimes implements interventions to solve the problems and needs identified in Fig. 1.

Thus, in the initial assessment, the nurse collects information to identify and respond to requests: what is the life risk level of the older adult person? Then what worries you? What strategies and capabilities does it have? This assessment results in whether the older adult person is at risk of life, and for that, it assesses whether they breathe and how they breathe, whether the older adult person has a pulse and what characteristics they have, such as speech and characteristics. This type of assessment brings about the intervention, as the nurse assesses the pulse through palpation, and simultaneously initiates the therapeutic touch, which is why their action is continuously mixed with diagnostic assessment and therapeutic intervention. As stated by [2] the nursing practice is the ability to evaluate, act and evaluate during one's actions. Thus the nurse's goal is instantly identifying the level of severity/risk and simultaneously being able to act accordingly, which gives rise to one of the therapeutic interventions - managing the risk of life for older adults, insofar as it acts to control and/or reduce the risk of life.

In addition, the nurse to assess and intervene makes use of clinical techniques (observation, palpation, auscultation) and clinical devices (sphygmomanometer, thermometer, flashlight etc.) to complete their assessment. After making sure that there is no risk to life, the nurse asks the older adults person why they are coming to the emergency unit, and what their complaints are. To understand the older adults' real problems nurses assess and check objective and subjective data (signs and symptoms), ask about previous problems, identifies visible and invisible injuries, and disabilities. At the same time, the nurse manages the collected information and promotes comfort (positioning on the chair or stretcher, providing a blanket, etc.). The nurse also manages negative feelings and demystifies fears and anxieties that the older adults may be experiencing caused by the uncertainty of being in an emergency unit, as well as, be empathic and show concern about the problems of the older adults person expresses, clarifying doubts, promotes

trustiness and shows openness and availability. This dialogue with the older adults contributes to the diagnostic evaluation and therapeutic intervention, and at the same time, initiates verbal contact, progressing in the therapeutic nurse-older adult relationship, as mentioned by Lopes [24, 27] and Sapeta [25], all contact between nurse and person serves to improve the relationship between both. Therefore, the relationship between them is fundamental to the care process. As we see through the diagram, the process of diagnostic evaluation and therapeutic intervention are simultaneous, the nurse evaluates and intervenes cyclically and dynamically. This relationship that is established between nurse/person and family tends to be more robust as time evolves [28].

One of the ways to identify the concerns of older adults is to carry out a complete assessment of the problems that lead people to resort to the emergency unit, and this involves active listening to what concerns the person, what problems they have and what makes them resort. For this, nurses must apply their clinical reasoning to discern ancillary information from relevant information, sort out problems, prioritize them and forward them according to the dimension of affection and the most appropriate health sectors [7].

This process of caring for older adults is progressively more important in today's world, given that we have an increasingly ageing population. Therefore, our concern must focus on the characteristics and needs of the older adults who live today and prepare health professionals to respond to the particularities inherent in current problems (the type of diseases, social isolation, etc.). In this sense, it is essential to implement strategies that can enhance nurses' clinical reasoning, such as investing in training using simulation [29]. Also, increase the literacy of older adults people and caregivers and create care corridors to limit the inappropriate use of emergency units. On the other hand, as mentioned by the World Health Organization [30] the Directorate-General for Health [31] and the United Nations [32], the development of analytical approaches in research may add knowledge about the main concepts related to healthy ageing, such as functional capacity, well-being, health status, personal characteristics, morbidity and care needs. In this regard, the protection of older adults is a cornerstone in the quality of health care and healthy ageing. In this sense, it is mandatory to define older adults' management protocols within institutions through assistance politics that can be built around four central axes of good practices: prevention, diagnosis, treatment and rehabilitation [33].

5 Conclusions

The Clinical Reasoning Process of Nurses used to assist people in the emergency unit is composed of two processes: The Diagnostic Assessment Process and Therapeutic Nursing Intervention Process. NCRP emerges based on Level I situations - the risk of life, and Level II situations - Expressed problems. These two processes happen in an intertwined and interdependent way. The main concern of the nurse when approaching older adults is to identify an early risk of life and manage this risk, as well as provide targeted and quick and effective interventions to avoid health complications. Also highly relevant is understanding the older adults' motives to go to the emergency unit, screening for social problems, and loneliness and the presence of a relative to provide support and help to face changes in functionality and/or multimorbidity.

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What Psychosocial and Rehabilitation Interventions in People Aged 65 and over with Multimorbidity, at Home, Lead to Health Gains? A Systematic Review Protocol

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Abstract. Background: The intersection between demographic ageing, the prevalence of non-communicable diseases and the multimorbidity paradigm, lead to greater human disability, increasing dependency and the need for health care. The use of tools that assist in the identification of functional disabilities is recommended, with the intention of developing appropriate intervention protocols for the older population.

Methods: A systematic review protocol will be conducted following the preferred report items guidelines for systematic reviews and meta-analyses. The search will be carried out in the CINAHL, MedicLatina, MEDLINE and Psychology and Behavioral Sciences Collection databases. We will include randomized controlled trials, in which any psychosocial or rehabilitation intervention is compared with usual health care. Screening, data extraction and quality assessment will be carried out by two reviewers with disagreements to be resolved by appealing to a third reviewer. The ROB 2 tool will be applied to perform the risk of bias assessment. If a sufficiently comparable group of studies is identified, we will perform a meta-analysis. The results to be extracted from the studies will be: psychosocial and rehabilitation interventions integrated in structured models of health care centered on the elderly person with multimorbidity, instruments for evaluating results and indicators of health gains.

Discussion: This review aims to systematize the most recent evidence on functional and psychosocial rehabilitation interventions described for people aged 65 years or older, at home with multimorbidity, and indicators of health gains from these interventions. The results can be used to inform decision makers, health professionals or other stakeholders, providing data to develop future interventions to improve health care.

PROSPERO registration number: CRD42022363860.

Keywords: Functionality · Health Gains · Older Adults · Home-Based Care · Multimorbidity

1 Introduction

Renowned world organizations have been expressing concerns about the repercussions of the increase in average life expectancy and the decrease in birth and death rates. According to the United Nations and the European Commission, the trend towards an increase in the number of elderly people has worsened, and it is expected that by 2050, the senior population will reach 20% of the population worldwide [1, 2]. These data, despite being recognized as civilizational achievements due to technological advances, the implementation of social protection policies and progress in health, also represent a challenge for the future development, restructuring and sustainability of health systems [3, 4]. Changes in demographic and epidemiological paradigms lead to an increase in the prevalence of functional deficits and complex chronic diseases, which implies an increase in the use of health care [5].

There is a need to restructure health care, through the implementation of new care models, adapted to the elderly. In this population, multimorbidity has a notable impact, being associated with dependence, regardless of age, sex or isolated diseases [6]. In the presence of chronic health conditions, self-care deficit or excessive dependence in this dimension can lead to worse health outcomes, namely physical and cognitive decline [7]. Especially in diseases with a higher risk of dependence, such as dementia or stroke, there is potential to prevent the need for long-term care [6, 8]. Given the sociodemographic characteristics, functional profiles and multiple pathologies of older people, it is necessary to adopt interventions within the scope of self-care [9, 10] and the development of action strategies that prevent older people from suffering progressive functional disability, increasing their satisfaction and quality of life [11, 12].

Rehabilitation is a set of holistic interventions with the intention of promoting functionality and reducing disability for individuals in a specific environment [13, 14]. The scientific evidence is congruent regarding the results of rehabilitation interventions. These lead to sustained improvements in quality of life, functioning, physical activity, mobility, endurance, muscle performance and body fat mass among older people [15–17]. Furthermore, the effects of these interventions on occupational satisfaction and satisfaction with the rehabilitation process are significant [18], and may also be effective in psychosocial aspects by improving the participation of individuals [19].

On the other hand, psychosocial interventions integrate psychological or social actions, not pharmacological ones, which aim to produce changes at a psychological, social, biological and functional level, promoting well-being [20, 21]. They refer to an interpersonal process that induces changes in attitudes, cognition, emotions and behavior, integrating strategies at the level of education, skills training, social support and relaxation techniques [22]. Psychosocial interventions contribute to improving quality of life, memory functions, executive functions, depressive symptoms, depression and activities of daily living [23, 24]. The set of alterations promoted by aging overcomes functional deficits of a strictly physical nature, so the need for support in other dimensions of human life, such as social well-being, will probably also change [25]. Knowledge about psychosocial interventions focused on the elderly, can be beneficial in terms of adapting, personalizing and optimizing the healthcare that should be directed to this population [26–28].

This systematic literature review aims to systematize the most recent evidence on functional and psychosocial rehabilitation interventions described for people aged 65 years or older, at home with multimorbidity, and indicators of health gains from these interventions.

2 Methods

2.1 Design and Study Registration

This protocol precedes the conduction of a systematic literature review and follows the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA-P) protocol (additional file) [29]. The planned systematic review will be conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines for reporting systematic reviews [30]. In accordance with the guidelines, our systematic review protocol was registered with the International Prospective Register of Systematic Reviews (PROSPERO) (<http://www.crd.york.ac.uk/PROSPERO>) on 10 November 2022, with the registration number CRD42022363860.

2.2 Eligibility Criteria

A systematic review of articles published in peer-reviewed journals will be conducted. To guarantee the rigor and systematization specific to this type of study, eligibility criteria were defined. We define the PICOS criteria as follows.

Population

In relation to study participants, inclusion criteria are Older people (≥ 65 years old) with multimorbidity, living at home, with lack of functionality or dependence on self-care, integrated into structured and person-centered rehabilitation programs.

Intervention

The current literary review will include studies about any psychosocial intervention or rehabilitation intervention used as part of structured, person-centered rehabilitation programs.

Examples of possible interventions to include are vigilance, promotion of health, health education, psychoeducation, coaching amongst other programs of mental health.

Comparator

Studies with or without comparative groups will be included in this review. Anyway, the comparison will be with older people (≥ 65 years) receiving usual care.

Primary Outcome

The primary outcome considered in this review will be the change or non-worsening of the state of mental health, functioning, and well-being. All interventions described that

lead to health gains in the domains of the person, family, community and health system and the tools used to assess these gains.

Secondary Outcomes

The secondary outcome considered in this review will be patient satisfaction and the quality of care, identified in the implementation of patient-centered care

Studies

Only randomized controlled studies will be included in this review.

2.3 Search Strategy

Data Sources

In the research strategy, it is intended to develop a comprehensive search in the following databases: CINAHL, MedicLatina, MEDLINE and Psychology and Behavioral Sciences Collection databases.

Search Terms

The research will include the combination of key concepts according to the Medical Subject Headings (MeSH) terms: Patient-Centered Care, "Older Adult" and "Multimorbidity", in the title and abstract. In this case, the search phrase could be as follows: (("Patient-Centered Care") AND ("Older Adult") AND (Multimorbidity)). Other keywords may also be used if necessary, such as randomized controlled trial, "patient satisfaction", "functionality", "health gains" or "home care". The search strategy will be adjusted according to each database and will be limited to the last 5 years, from 2017 to 2022, in English, Portuguese, German, French and Spanish.

2.4 Study Selection

The studies resulting from the search in each database will be exported to Mendeley and duplicates will be removed. The search will be conducted in the databases by a first author. Initially, titles and abstracts of studies identified using the described strategy will be independently screened by two authors to select relevant studies. Any disagreements between the two authors will be discussed until consensus is reached. A third author will be involved in this discussion and will facilitate the process when necessary. In a second step, full texts of potentially relevant studies will be obtained and reviewed independently by two authors. Any disagreements between the two authors will be resolved by consensus with a third author. A PRISMA flowchart will be presented with the results of the screening in the different phases.

2.5 Data Collection

The data extraction and analysis will follow the guidelines of the Cochrane Handbook of Systematic Reviews of Interventions [31]. The following information will be extracted from the included studies: publication details (first author, year, title, country of study,

funding source), study design, information about study methods (purpose of study, inclusion/exclusion criteria for participation in the study, recruitment, number of participants, randomization procedure, statistical analyses, study limitations), participant characteristics (number of participants, number of dropouts/participants excluded, mean/median age, age group, gender, ethnicity, number and type of comorbidities) intervention details (intervention name, intervention objective, number of intervention/control groups, intervention components and levels, intervention delivery, intervention site, duration of intervention, duration of follow-up, underlying theory), primary and secondary outcomes, measurement of outcomes, times when data were collected, effects of intervention on outcomes primary and secondary data and authors' opinion conclusions. Data will be independently extracted by two reviewers into structured summary tables. Both will read the article in detail, ensuring that no relevant information is missed. Any disagreements will be discussed and in case of disagreement, a third reviewer will be consulted.

We will contact study authors for clarification in any case of uncertainty regarding data collection and critical appraisal.

2.6 Outcomes and Prioritization

Psychosocial and rehabilitation interventions integrated into models of guaranteed health care, centered on the elderly person with multimorbidity and that led to health gains were recorded as primary outcomes and will be described. If there is sufficient homogeneity in the interventions, they will be grouped to facilitate an analysis. Secondary outcomes will be the health gains achieved through these interventions and the tools used to assess these gains.

2.7 Critical Appraisal

Two reviewers will independently assess risk of bias in included studies using the Cochrane Collaboration tool to assess risk of bias in randomized trials for each included study (RoB 2) [32]. This instrument provides a framework for assessing the risk of bias in a single estimate of an intervention effect reported from a randomized trial [32]. Any disagreements will be resolved by consensus or, if necessary, by a third review author. The risk of bias assessment for each study will be presented in a table along with other characteristics of the included studies.

2.8 Data Synthesis

The initial analysis will be descriptive in nature, in a structured way, to answer the research questions. Interventions and outcomes will be described. Where there is homogeneity across studies in the palliative care interventions used and the outcomes measured, we will compare the results. Tables, graphs and/or figures will be prepared to present the data results in a synthetic way, facilitating the comparison of the findings of each study included in the review. The characteristics of the studies to be included must correspond to the following data: evaluation instruments used to evaluate health interventions in the elderly; interventions implemented to lead to health gains or health

outcomes; and the results of the interventions implemented, that is, evidence that the interventions lead or not to health gains. If we find a sufficient number of studies with comparable interventions and similar assessments of health outcomes, we intend to perform a meta-analysis. The strength of the body of evidence will be assessed using the GRADE system (Recommendation, Development and Evaluation Assessment Grades) [33]. In case there are changes to the protocol, they will be explicitly declared in the final manuscript of the review. The systematic review will be conducted according to the guidelines of the Cochrane Handbook of Systematic Reviews of Interventions [31].

3 Discussion

This systematic literature review aims to systematize the most recent evidence on functional and psychosocial rehabilitation interventions described for people aged 65 years or older, at home with multimorbidity and indicators of health gains from these interventions. This study intends to increase knowledge about the implementation and evaluation of safe, integrated and adapted health care models, constituting a basis for tangible future recommendations, for professionals, managers, policy makers and other interested parties. At the level of clinical practice, systematized evidence could be useful from the perspective of data collection, care planning, implementation and evaluation of interventions. This knowledge can support decision-making in the context of health and resource management. It will also allow the improvement of quality standards in the provision of health care, allowing a systematic evaluation of health outcomes, increasing people's satisfaction and obtaining health gains.

Author Contributions. All authors will contribute to the study as follows: AL initiated the study design; CF, LP and TC initiated the study design and reviewed the study. AL, LP and CF drafted the protocol and LP, CF and TC reviewed the manuscript. AL, CF, LP and TC provided theoretical, practical and research knowledge about rehabilitation and psychosocial interventions in older adults. All authors contributed to refinement of the study protocol and approval of the final manuscript.

Abbreviations

GRADE: The Grading of Recommendations Assessment, Development and Evaluation

ROB 2: Cochrane collaboration tool to assess risk of bias in randomized

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Comfort in Rehabilitation Nursing Care: Multiple Case Study

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Abstract. Functioning allows a life with independence and autonomy, Comfort serves as the basis for human development. Objective: to characterize the comfort perception of patients assisted by a specialist in rehabilitation nursing, identify sensitive care outcomes and relevant comfort factors. Method: Multiple case study, descriptive. Twelve patients hospitalized and at home participated in the study, from September 13, 2021 to January 23, 2022. Study approved by the ethics committee, carried out within the scope of Master's in Nursing. Instruments: Functional Independence Measure Mini-Mental State Examination Holistic Comfort Scale – Chronically Ill (HCQ-PT-DC). Results. Most participants had compromised self-care, eating, personal hygiene and dressing, the results reveal a significant difference ($X^2_F(2) = 13,231$; $p = .001$; $n = 8$) between the previous assessment and the 1st assessment ($p = .003$). The perception of comfort was evaluated in 6 participants and re-evaluated in 4, in all cases, there were improvements in one or more of the types of comfort. Conclusion. The importance of the initial assessment of Comfort in patients undergoing rehabilitation programs emerges, as it can influence the success of recovery interventions.

Keyword: Rehabilitation Nursing · Patient Comfort · Hospitalization · Home Care Services · Rehabilitation Outcome

1 Introduction

Comfort is complex, dynamic, individual, positive, holistic and allows achieving relief, tranquility and transcendence in different contexts, being considered a central concept in Nursing [1–4]. Contributing to the comfort of users means strengthening them, allowing them to recover what they perceive as health [3].

According to the Theory of Comfort, this translates into the satisfaction of needs in relief, tranquility and transcendence, in four contexts, physical, psycho-spiritual, social and environmental. Oliveira [2] indicates that comfort can be defined by the contribution of something/someone to your strength, by providing a form of help, which allows you to develop or improve your individual capacity to face what affects you. This may refer to

the concept of resilience: ability to deal with a problem without it becoming a disruptive event in the individual's life, characterized by a process of adjustment to new conditions, which starts with the development of stress reaction skills [1, 2, 5].

The interventions developed with the purpose of promoting comfort are, according to Machado et al. [6], a good Nursing care practice, if they are in accordance with the user's needs and priorities. In Nursing, Comfort can be identified in different ways, such as the "demonstration of the satisfaction of a need, relief of pain or physical discomfort, feeling of tranquility, calm, peace and promotion of an adequate environment" [6].

For Schoeller et al. [7], rehabilitation nursing corresponds to a specialty that operates throughout the life cycle and in all health-disease processes, targeting the person, but also his family, environment and the community in which he lives insert. Its objective is that users with deficits in terms of Functioning achieve an improvement in their quality of life, being able to maintain the maximum independence and autonomy possible, as well as enjoy a reintegration into society, with rights, duties and social interactions. That this entails [7].

The specialist in rehabilitation nursing is present when confronting the presented deficits, in the management of expectations, in the planning and in the establishment of realistic expected results, his interventions can cause changes in terms of physical comfort and he is faced with multiple feelings and different reactions on the part of the user throughout the rehabilitation program [6]. In the light of current knowledge, it is essential that your clinical practice focus on comfort, insofar as understanding the user's comfort needs can help to individualize and enhance the planning and interventions put into practice and, thus obtaining positive results in terms of Functioning and quality of life [2, 3].

Evaluating and intervening in comfort can justify a user's stagnant evolution, contribute to better adherence and collaboration with the rehabilitation program and even allow better results to be obtained in the recovery of users [6].

Thus, multiple points of intersection are identified in the relationship between comfort and rehabilitation nursing. The increase in comfort improves the quality of life of users, which is one of the main objectives of rehabilitation nursing and the increase in Functioning of users through specialized rehabilitation care, promotes satisfaction and can contribute to an increase in comfort. In this way, contributing to comfort can benefit the work carried out by the specialist nurse in rehabilitation nursing, obtaining better results, such as maximizing the autonomy and independence of individuals contributes to comfort, which suggests that they are inseparable and their relationship must be explored [6].

Objectives: To characterize the perception of comfort of users assisted by a rehabilitation nursing specialist, in home and hospitalization contexts; identify relevant comfort factors for rehabilitation nursing care.

2 Methods

The study followed the methodology of the Nursing Process with which case studies of a descriptive nature were carried out.

Steps: In accordance with the methodology, for each case study, the initial assessment steps were followed; nursing diagnoses; intervention planning; implementation and (re)evaluation/final evaluation, [8].

The initial assessment was carried out in the first contact with the participant, the data were analyzed in order to formulate the rehabilitation nursing diagnoses. The process of validating the diagnoses was carried out by two advisors. The planning was carried out using a theoretical review, the intervention was always developed by the author, with supervision and the evaluation of results was carried out in the middle and at the end of the intervention. On average, 3 interventions were performed on each participant.

Instruments: The diagnostic and final evaluation was carried out using instruments aimed at the study concepts: Functioning through the Functional Independence Measure (FIM), translated and adapted into Portuguese [9–11] and comfort, through the Holistic Comfort Scale – Chronically Ill (HCQ-PT-DC), validated for the Portuguese population [12]. The Mini-Mental State Examination [13] was also applied in the initial assessment to measure cognitive functions, with the aim of selecting the participants able to respond to the comfort questionnaire.

Analysis: The data obtained were analyzed from a descriptive perspective in order to characterize each case study carried out. Descriptive statistical measures of central tendency and dispersion were used to present the participants' socio-demographic and health data.

The IBM SPSS Statistics for Windows software, version 24, was used for inferential analysis of the Functioning evaluation data. Friedman's non-parametric test was considered, with a significance level of 95% ($p \leq 0.05$) to determine whether the FIM values are similar in the three assessments. The FIM result is ordinal in nature and the three repeated assessments for all participants fit the required conditions for the Friedman test [14]. The multiple comparison of averages of orders was calculated to identify the results that presented a significant difference [14].

Study approved by the Ethics Committees of the Institutions involved (Document n°. 21057 University of Évora). Informed consent was expressed by the participants in their own form. Data does not identify participants or sources.

Twelve users participated who, from September 13, 2021 to January 23, 2022, were the target of Rehabilitation Nursing care in the clinical contexts of the curricular internships. Four users hospitalized in a Stroke Unit (SU), ($n = 4$; 33%) and eight users hospitalized in a Home Hospitalization Unit (HHU), ($n = 8$; 67%).

3 Results

Participated in equal number man ($n = 6$) and women ($n = 6$), with a mean age of 69.4 years (standard deviation of 20.9 years; Min. = 18 years; Max = 90 years). Regarding marital status, it was found that most participants were married ($n = 8$; 67%), while the remaining participants were widowed ($n = 3$; 25%) and one of the participants was single ($n = 1$; 25%). 8%).

Most participants had completed the first cycle of schooling ($n = 7$; 58%). At the SU, more than half had completed the 4th year of schooling ($n = 3$; 75%), while at the HHU, three participants had completed the 1st cycle of schooling or a lower level

of schooling ($n = 3$; 37.5%) and four participants had completed the 11th grade or secondary education ($n = 4$; 50%).

Among the total reference persons of the participants, the most identified kinship relationship was: spouse ($n = 6$; 50%). It was found that 67% ($n = 8$) of the reference people lived with the participants.

Participants admitted to the SU were all diagnosed with stroke in the territory of the middle cerebral artery ($n = 4$). Regarding the participants admitted to the HHU, they had different diagnoses, namely related to analytical, cardiac, respiratory and neurological disorders, among others.

All participants had a personal health history. The personal antecedent mostly identified was high blood pressure ($n = 8$). The second most identified personal antecedent was type II diabetes mellitus (DMII) ($n = 6$). In the case of participants with DMII, all had at least one more chronic disease situation, with the most representative association being that which includes DMII and hypertension ($n = 3$; 25%).

3.1 Functioning

With regard to Functioning, it was found that five participants had changes in Functioning prior to hospitalization, and the remaining (seven) were completely independent.

All participants admitted to the SU had a deficit in self-care ($n = 4$), assessed before the intervention. The final evaluation revealed a favorable evolution in three participants and one remained unchanged. The intervention plan included self-care training, compensatory postural measures and sensory stimulation, and adapting food texture.

Also, all SU participants did not have control of bladder and intestinal elimination, a condition that remained until the final evaluation.

Compromised verbal expression ($n = 4$) and comprehension deficits ($n = 3$) were addressed using augmentative communication techniques with favorable evolution in one participant.

At the HHU, the eight participants presented alterations in Functioning, seven aggravated due to hospitalization and one without alteration to the previous status. More specifically, it was found that the items "stairs" ($n = 7$) and "gait" ($n = 6$) were the ones with the highest percentage of participants with deficits. In a smaller percentage, but equally important to mention, it was identified that five participants presented alterations in the item "Bath" and four of them presented alterations in the items "Dressing the lower half" and "Transfers to bathtub/shower". In all other items, with the exception of "Bowel Control", there were participants with changes in Functioning.

Regarding the evolution of the participants, after the intervention program, all ($n = 8$) were identified, they presented positive evolution in terms of food ($n = 3$), also verifying positive results in terms of the item "Dressing the lower half" ($n = 3$) and "Bath" ($n = 3$).

In the item "stairs", where there was a greater number of participants with deficits ($n = 6$; 75%), it is also where the smallest measurable evolution was identified, without any user presenting a change in the final score. This result is related to the clinical condition of the users, which made it impossible to train them to go up and down stairs, which would only be possible if the number of sessions were considerably higher. The same was true of the item "Bladder control" and "Problem solving", in which it was

not possible to obtain a positive evolution, but rather a maintenance of the condition of Functioning obtained in the initial evaluation.

The intervention plan carried out for each of the participants included assisting in self-care, teaching and training the participant and the caregiver in carrying out life activities, assisting and training effort management techniques, breathing exercises, balance and gait training.

Considering the final value obtained by the FIM, it was verified that the highest mean is verified prior to hospitalization (118.50 points; standard deviation of 20.248) and the lowest mean corresponds, as expected, to the moment before the nursing intervention of rehabilitation (99.25 points; standard deviation of 25.267) (Table 1).

Table 1. .

	N	Minimum	Maximum	Mean	Std. Deviation
FIM - Preview	8	68,00	126,00	118,0000	20,24846
FIM – 1ª evaluation	8	43,00	125,00	99,2500	30,82091
FIM- Final evaluation	8	61,00	125,00	104,1250	25,26679
Valid N (listwise)	8				

In order to analyze the significance of the values obtained, Friedman’s non-parametric test was performed, considering a significance level of 95% ($p \leq 0.05$) to determine whether the FIM values are similar in the three assessments. The results revealed that the FIM values have a significant difference ($X^2_F(2) = 13,231; p = .001; n = 8$).

To determine at what stage of the intervention the differences in the FIM are significant, a multiple comparison of the averages of the orders was carried out, and the difference occurs between the previous evaluation and the 1st evaluation ($p = .003$) (Fig. 1).

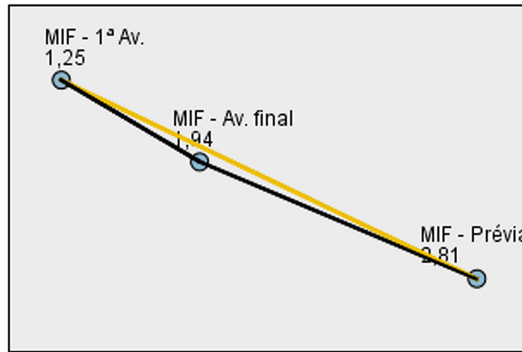
3.2 Comfort Perception

The perception of comfort, it was evaluated in six of the participants who, according to the results of the Mini-Mental State Examination, did not present a cognitive deficit.

It was found that in all types of comfort and associated contexts, more than one of the participants had a reduction in the total score. More specifically, it was identified that the six participants had changes in sociocultural relief; five had changes in physical relief, psycho-spiritual relief and psycho-spiritual tranquility; four had reduced scores at the level of sociocultural and environmental transcendence; four had alterations in terms of psycho-spiritual transcendence and two expressed alterations in physical and sociocultural tranquility.

Among the six evaluated participants, it was possible to carry out 4 reassessments at the time of discharge, verifying that, in all cases, there were improvements in one or more of the types of comfort, after the institution of the rehabilitation program.

Pairwise Comparisons



Each node shows the sample average rank.

Sample1-Sample2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
MIF - 1ª Av.-MIF - Av. final	-,688	,500	-1,375	,169	,507
MIF - 1ª Av.-MIF - Prèvia	1,562	,500	3,125	,002	,005
MIF - Av. final-MIF - Prèvia	,875	,500	1,750	,080	,240

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same. Asymptotic significances (2-sided tests) are displayed. The significance level is ,05. Significance values have been adjusted by the Bonferroni correction for multiple tests.

Fig. 1. Pairwise Comparisons of Functioning ratings (MIF)

In terms of relief, it was identified that three reassessed participants showed an increase in the score, which translates into an improvement.

Among the reassessed participants, two expressed improvements in sociocultural and psycho-spiritual relief and one perceived greater physical relief.

In the final evaluation, even greater tranquility (n = 2) and greater sociocultural transcendence were identified. Three participants who expressed changes in terms of environmental transcendence maintained the same condition in the final assessment.

Evolutions of the scores in a negative direction were also identified, in some cases in types of comfort and contexts where changes were not identified in the initial assessment, which suggests the detection of new needs in Comfort.

Physical relief was the only type of comfort and context in which none of the reassessed users showed a reduction in scores. In all other types and contexts, at least one of the reassessed participants showed a reduction in the score obtained.

4 Discussion

Recovering the General Theory of Self-Care Deficit, developed by Dorothea Orem, the results demonstrate the need to intervene in order to assist users in their self-care,

according to the limitations presented, always with the objective of not replacing them, but promoting a recovery of its independence. According to Orem, self-care derives from a deliberate learning process, which justifies the importance of intensifying rehabilitation nursing intervention in education and training, enabling users to adopt strategies that promote the improvement/maintenance of their Functioning. This premise underlies the reasoning developed in the planning carried out [15, 16].

The intervention developed at the SU was centered on the participants, not presenting the specificity of preparation for discharge, but rather a first approach to the deficits they presented. Also in this phase, the first interventions adapted to the individual began, favoring early rehabilitation which, as already mentioned, offers several benefits, especially in terms of Functioning [17].

At the HHU, the reference persons were mainly the spouses and, given that the rehabilitation program was carried out at the users' homes, where this family member was also present, the interaction involved both and favored the training of both to manage the process. Training an individual implies a multidimensional process, which allows him to develop the necessary knowledge, to have the ability to decide and, subsequently, to translate his decision into action [18, 19].

Educating people about their health is a process that builds knowledge and develops abilities and skills and cannot be narrowly defined as the acquisition of knowledge and reproduction of behaviors [20]. On the other hand, empowering an individual implies that, in addition to the knowledge derived from the education process developed, this person is endowed with autonomy, that is, that the person is able to make their decisions freely and live based on them. Thus, intervening in knowledge and learning focuses means that the specialist nurse in rehabilitation nursing empowers the person, enabling him to make decisions and act in order to deal with the various obstacles he may encounter throughout his health-care process. Disease health-disease process health-disease process health-disease process health-disease process [19].

At SU, all participants were in a transition process, with a strong emotional implication in the Functioning recovery process. At the HHU, a transition process was also identified, in this case endowed with a high need for adaptation and some creativity, related to the reintegration of the participant in his personal environment, gradually returning to his usual routine and adapting it to the changes that resulted from the most recent disease process and consequent period of hospital stay. The theoretical framework that supported and led the provision of rehabilitation care in important transition processes was Afaf Meleis' Theory of Transition, which conceptualizes transitions as unique and complex changes that translate into the path between two states of stability. By understanding the transition process, it is possible to plan individualized rehabilitation nursing care, with implications for the quality of life of individuals [16, 19, 21].

Social reality has implications for health, which is constantly changing. Current progress deprives the importance of humanizing and dignifying care, which is centered on the user, that is, on what is best for them, allowing them to build a meaningful life, regardless of their health and illness condition and deficits that can present [22]. In this way, the diagnoses formulated, in addition to arising from the initial assessment of the deficits, integrated the comfort needs of the users, their priorities in relation to their well-being and their expectations, which is why they were constructed in such a way as

to place the individual and with the final objective of obtaining the best possible results, with an influence on the comfort and quality of life of the user.

According to Sousa [22], everyone develops his life project, for which he seeks comfort, balance and well-being and, in such a path, care that maximizes Functioning and promotes quality of life is essential. He adds that “Quality in healthcare is now a growing responsibility” [22]. Thus, the importance of the relationship between Functioning, comfort and quality of life in the provision of care is highlighted.

In agreement with Kolcaba, who sees the comfort process as incomplete, if there is no evaluation [22, 23], which considers essential the determination of the perception of the person’s total needs, the interventions carried out in this sense and the evaluation from the results, the scale in question allowed an assessment and reassessment of comfort, putting the Nursing Process into effect and making the intervention complete and more meaningful.

According to Sousa [22], the “construction of comforting care emerges under the influence and articulation of the context of care, actors and foundations that unify in different domains. The importance of a global response in a multidisciplinary approach towards the same end is highlighted, which reflects the current perspective of providing global health care”. Considering the various concepts presented for comfort and the different theoretical references that were presented, due to the way they permeate the conduct of the specialist in rehabilitation nursing, as well as the experience of applying the intervention project in a clinical context and the data obtained through it, emphasize the importance of encouraging professionals in the area of rehabilitation nursing to integrate concern for comfort into their specialized practice and to act as promoters of awareness among general care nurses and other health professionals regarding the importance of integrating concern for with Comfort in health, as a way of improving the quality of care provided, improving the quality of life of users and, in general, as a way of promoting the satisfaction of all stakeholders.

5 Conclusion

Functioning and Comfort are two concepts closely linked and essential for any human being. While Functioning allows the performance of life activities and integration into society, comfort is at the base of human development, being essential for personal growth and the recovery of autonomy and independence. Due to the relationship between Functioning and comfort, as well as the numerous benefits that can be obtained from the provision of comfort-promoting specialized rehabilitation nursing care, one understands the importance of exploring the relationship between this area of expertise and the theme of comfort.

Rehabilitation nursing is developed based on numerous theoretical references, with Meleis’s theory and Dorothea Orem’s theory standing out in the study. From the words of these authors, it is possible to conclude the importance of an adequate assessment of the individual, dictating the degree of individualization of care, which in turn contributes to increasing its quality. While rehabilitation nursing values the provision of individualized and humanized care, the level of comfort is translated by adapting interventions to the concrete needs of users, which is achieved through the establishment of a therapeutic

relationship, an interpersonal relationship characterized by the humanization of the user and allowed by the human and professional qualities of those who establish and develop it [22]. Thus, integrating comfort in the provision of rehabilitation nursing care means making it meaningful, individualized and endowed with higher quality, which gives satisfaction to users and professionals.

Importance of the study for the investigation: The moment of discharge was characterized by the presence of factors that could compromise comfort. It is concluded from the data obtained that the study of the phenomenon can provide important information for a more individualized discharge planning with higher quality.

Study limitations: Number and intensity of rehabilitation nursing care.

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Older Adults and Gambling: Dangers, Risks, Socialization and Elements of Normalization

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Abstract. The phenomenon of gambling and betting has set off alarm bells because of the havoc it is wreaking on certain age groups, especially adolescents and young people. However, once a market niche has been consolidated, there are other groups that are also being targeted by marketing strategies: women and senior citizens. In this case we want to focus on the latter. The proliferation of gaming opportunities and the aging of the population has led to a higher prevalence of gaming among older adults. There are older adults who have gambled all their lives. In other cases, changes such as retirement, loneliness or loss of a partner may lead the person to enter the world of gambling and betting. In this essay we approach the problem through a bibliographic review and a brief fieldwork with three testimonies of older adult gamblers. We have chosen to use an IMRD structure.

Keywords: Gambling behavior · betting · game of luck · elderscence · older adults

1 Introduction and State of the Art

Gambling disorder, also known as gambling addiction or compulsive gambling, is a type of impulse-control disorder. It is a mental health condition in which a person is unable to control their impulse to gamble, even when it has negative consequences on their life. People with gambling disorder may feel an intense urge to gamble, even when they know it is causing problems for themselves or their loved ones. They may try to stop gambling, but find themselves unable to do so. Gambling disorder can lead to financial problems, relationship difficulties, and other serious issues. Treatment for gambling disorder often includes therapy, medication, and support groups. It is important for people with this condition to seek help from a qualified mental health professional in order to address their addiction and avoid the negative consequences of their gambling.

Senescence is a term used to refer to the process of aging. Senescence is the natural process of growing older, and is characterized by changes in physical, mental, and emotional functioning that occur over time. These changes are typically gradual and can

vary from person to person. Senescence is a normal part of the aging process, and is not considered a disease or disorder. However, it can be associated with certain health problems, such as chronic diseases and age-related declines in physical and cognitive functioning. These changes can be managed and treated with appropriate medical care, and many older adults are able to live active and fulfilling lives despite the challenges of senescence.

Seniors play an increasingly important role in the telematic society [1]. However, it is not all advantages, as the information society admits two opposite approaches: being the gates of hell or the antechamber of paradise [2]. The information society has enthusiastic followers and disenchanting exiles. Eco [3] identified them as apocalyptic or integrated. Looking at the date of these last two quotes it is easy to understand that it is difficult to find someone totally alien to the processes of the digital society. Although perhaps the elderly is a typical scenario in which to find a more marked digital divide. But it is not a totally accurate variable. The use of technology by the elderly is sometimes conflictive. But on the other hand, technological advances in recent years have made possible a culture of care for the elderly [4]. We can also highlight that an important part of this age group has grown old with technological products, establishing a relationship of frequent use. More and more of the adult population shows a positive attitude towards communication technologies [5, 6]. From now on we will try to focus on the relationship between the use of communication technologies and gambling.

In the fall of 2022, a video of a large group of elderly people playing slot machines went viral on networks and in the press <https://cutt.ly/g0a1paZ> (See Fig. 1). Numerous authors report that more and more older adults have a problematic relationship with gambling. In older people there are different factors that can awaken the desire to gamble. With the changes that occur after retirement and with the natural aging process can come loneliness or the loss of a partner. Sometimes it may be necessary to find alternative ways of escape, and play may be one of them. For this group, starting to gamble can be a leisure option, not a way to obtain money. A way to escape from the depression or emotional instability that some of them experience. Gambling can be presented as a way of freeing oneself from reality but one that ends irretrievably. However, there is not much literature focused on gambling in the elderly. Unlike what happens in other ages, such as adolescence, there are few studies that focus on people over 65 years of age. However, it is an age in which several risk factors can converge and generate a situation of risk or danger [7].

Del Pino [8] highlights the vulnerability to gambling in old age. He tries to explore the most popular games in his sample. Before continuing, however, we would like to highlight Medeiros [9] assessment of the sociocultural nature of gambling. Del Pino notes that the most popular games are lotteries (60%), pools (13%) and bingo (12%). More than half of his sample acknowledged not gambling, but 8% had problem gambling and 1.4% had a gambling disorder [8]. This again reflects the association between alcohol consumption and gambling and the greater presence of men in these activities. These rates are similar to those detected in Canada by Philippe [10]. He reports 1.2% for pathological gambling and 1.6% for risk gambling.



Fig. 1. Older people playing slot machines. @nlwestfall en TikTok.

Subramaniam [11] provides a review of the scientific literature between 1995 and 2013. They highlight that as age increases, the prevalence of gambling decreases. Contrary to Levens [7] he finds more tendency to gamble in men than in women. He identifies more cases of problem gamblers in people living alone. He also warns that fixed incomes and limited prospects for future earnings make them an extremely vulnerable group.

Medeiros [9] insists on the scarcity of studies, detecting that they are more frequent in Anglo-Saxon countries. He reflects the increase in cases of gambling disorder in modern societies. Like Leven, he qualifies it as a public health problem. He introduces the cultural value, and notes that the country of origin influences the possibility of falling into problem gambling. There are countries where gambling and betting are culturally rooted. Evidently, there are more cases of problem gambling in these countries where gambling is part of the culture and tradition.

Guillou-Landreat [12] laments the scarce literature analyzing gambling in older adults. She highlights that it is especially scarce in Europe. She describes gambling as a popular and cross-cultural activity. He notes different factors that condition the profile of the gambler: individual, financial partners and environmental. In historical perspective, he warns of the increase in the percentage of elderly gamblers (from 23% to 50%, between 1975 and 1998, in the USA). It highlights as dangerous gambling habits early exposure and availability and proximity of places where gambling can take place. The existence of economic, social and family problems also act as accelerators of gambling. Far from solving these problems, gambling aggravates them. It reveals the existence of individual vulnerabilities, such as negative life events, personal psychiatric/addictive comorbidity, or family history of problem gambling or substance use disorders. He also notes that there are cognitive distortions that are related to the inability to control or stop gambling. He highlights that craving is an urge to engage in gambling and a decrease in

cognitive control was identified in with impaired activity in the prefrontal cortex. More significant medical or psychosocial comorbidities are reported in elderly people with gambling problems than in non-gamblers or non-problem gamblers (Fig. 2).

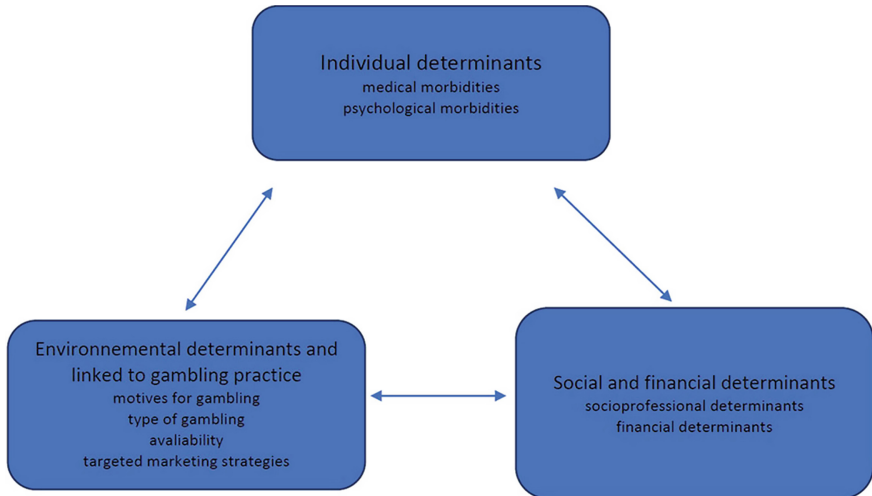


Fig. 2. Determinants that condition gambling. Guillou-Landreat [12]

Levens [7] describes the problem of gambling in older adults as an important public health concern. In his study, he found that 10% of the patients examined gambled beyond their financial means. He finds a strong link between binge drinkers and high-risk gamblers. This relationship shows a disposition towards the accumulation of dependencies in a single subject (polydependencies). Jazaeri [13] insist on the relationship between problem gambling and substance use. Saunders [14] reflects the genetic component of addictions. Not that it is necessarily hereditary, but that a number of genetic markers predispose to problem gambling.

Alberghetti [15] focuses his analysis on Canadian society. The proliferation of gambling opportunities in Canada coupled with an aging population has led to a higher prevalence of gambling among older adults. This factor can be extrapolated to other countries with high life expectancy. In addition to this logical factor, he explores the emotional factor when it comes to gambling. It analyzes the impact of the passion put into the act of gambling. He finds that the later in life, the more beneficial recreational gambling is. But it is also more dangerous if one falls into problem gambling. Philippe [10] also analyzes the passion factor to try to understand why the rate of problem gambling is slightly higher in older people than in the general population.

Like Alberghetti, Tse [16] also highlights the aging of populations. Along the same lines, technology placed at the service of elderly care increases life expectancy and improvement in quality of life [4]. This situation, coupled with the increased availability of gambling facilities, means that older adults are able to gamble more and may be increasingly at risk for problem gambling or pathological gambling disorder [16]. He goes on to expound that the number of older adults participating in gambling has

increased dramatically in recent years and may continue to increase. In addition, compared to the general population, older adults have more free time and more or less guaranteed disposable income. Later life transitions, such as retirement, lack of opportunities to socialize, death of a spouse and friends, and chronic illness, which may lead them to turn to gambling and other behaviors (drinking) as a distraction from life [16].

There is no scientific literature to support the role of the gambling industry. There are conditional reports to soften the impact. Faced with this social problem, what does the gaming industry say? USA Online casino relativizes the problem with a historicist discourse. It puts the focus on the increase of leisure time, the possibility of winning money, and even the health of old brains. Ridiculously it argues that these elderly gamblers are the ones who ignited the flame of gambling.

Some people believe it's because they have too much time on their hands following retirement; others form the notion that gambling is a fun and lucrative way for them to keep their brains busy as they age. Both of these beliefs could easily apply to individuals. After all, it's the older generations and their ancestral lines that ignited the gambling industry's flames when it became legal in the U.S. in the mid 19th century. <https://bit.ly/3uVCgSA>.

However, he then takes the subject more seriously to focus on the plight of many elderly people whose situation makes them vulnerable victims of this perverse system.

For many older adults who live alone, are isolated socially, or who have been through a divorce, separation, or who have a low income—gambling has become a clutch and a way to fill a void in their lives over time. Although only a small proportion, this lifestyle has seen a lifelong prevalence of gambling addiction in approximately 10.6%, according to a systematic review conducted on gambling addiction in over 65s. More recent industry data indicates that over half of the visitors who play at land-based casinos are 50 or older. At the same time, a poll concluded that 70% of senior American citizens owned up to having gambled in the last year. These figures are concerning for anyone who thinks gambling is strictly a leisure time activity. But the fact of the matter is that gambling addiction hotlines are always ringing, and nine times out of 10 it's grandma or grandpa who is on the other end of the line. <https://bit.ly/3uVCgSA>.

As a possible solution to this problem, Almeida [17] highlights the importance of family networks and social and community mediation. In any case, it is necessary to identify the motivations that encourage gambling. Evidently, the same authors continue, there is a notable improvement in the quality of life of people who give up gambling. Kim [18] also highlights the importance of immediate treatment. Although they reflect that prevention is preferable. However, the earlier a problem gambler is treated, the better the prospects for recovery.

2 Methods

A bibliographic review is a summary and evaluation of the literature on a particular topic. It involves reviewing and analyzing the existing research on a topic in order to identify key themes, gaps in knowledge, and areas for further study. Bibliographic reviews are often used to provide an overview of a subject area, to identify trends and patterns in the research, and to highlight important contributions to a field of study. To

conduct a bibliographic review, you would typically start by identifying a specific topic or research question, and then search for relevant literature using various sources such as academic databases, library catalogs, and the internet. You would then read and evaluate the literature, taking notes and summarizing key points. Finally, you would write up your review, organizing the information and highlighting the most important findings and implications for your topic. Bibliographic reviews can be written in a variety of formats, including narrative reviews, systematic reviews, and meta-analyses, depending on the goals and scope of the review.

Ethnography is a research method in the social sciences that involves the systematic study of social groups and cultures. It involves the collection of data through various methods, including observation, interviews, and document analysis, with the aim of understanding the lived experiences and cultural practices of a group of people. Ethnographers typically spend a significant amount of time in the field, immersing themselves in the culture and community they are studying in order to gain a deep and nuanced understanding of their subject. Ethnography is often used in anthropology, sociology, and other social sciences to study the culture and social norms of a particular group or society. Ethnography opens an epistemological path to knowledge. The primary source is one of the great neglected of the social sciences and is almost absent in scientific journals. Except if it is ethnography, of course. However, direct contact with the informant allows building a more accurate and complete account of the social phenomenon. The fact studied is multidisciplinary and the interview, the survey and the quantitative forms acquire their own weight in this epistemology [19]. Getting closer to the protagonist or participant of the experience makes it easier to understand their reason for being.

In this article we find a phase of bibliographic review where we analyze specific material on old age and gambling. A priori, as other studies show, there is not much material on the subject. And most of what there is related to the Anglo-Saxon world. Nevertheless, what has been analyzed serves to make a composition of place and to draw out the most worrying variables in previous studies. Subsequently, we include an ethnographic approach with non-participant observation, two case studies in embryonic stage and a third account obtained from a social research documentary. We will analyze the gambling trajectory of two people, a man and an elderly woman, with intensive use of gambling products. One of the subjects is British, as we want to include in this analysis the sociocultural perspective of Medieros [9] and Guillou-Landreat [12].

3 Results: Non-participant Observation and Case Study

In order to understand the phenomenon in first person, we want to briefly expose the conclusions drawn from the ethnographic approach towards two subjects, older adults. To do so, we have interviewed and observed the behavior of two individuals with problematic relationships with gambling.

Subject 1, female, 88 years old. Spanish. Conflict gambler since she was young, fond of conventional gambling systems (Bingo, lotteries, coupons...). She is not influenced by her close family environment. From a young age she develops passion for all types of games and with time she develops problematic and conflictive gambling. The need to gamble conditions all facets of his life: family, work, leisure time. After retirement,

he enjoys more free time, which he uses for his hobby, which has become an addiction. In the first days of the month he spends his monthly income. This generates a survival economy. At this point, gambling becomes gambling addiction. He has passed on his passion for gambling to his family members. Two daughters and several grandchildren gamble compulsively.

Subject 2, male, 80 years old. British who emigrates to Spain. Comes from a society where gambling is accepted and normalized [20]. More than half of the adult population gambles relatively frequently and consumes alcohol. Establishments with different gambling games are frequent [21]. Before, our subject is enculturated in a scenario proper to the consumption of alcohol and gambling games. In his displacement to Spain, he looks for a place where he can satisfy the dependencies developed in his country of origin. A house near a bingo and a supermarket is the ideal place. He continues to gamble. In his family environment, no one else feels the need to participate in gambling.

Subject 3. 75-year-old male (https://youtu.be/RjUbsn_EERY) Acknowledges feeling the need to gamble since he was a child. He starts gambling large amounts when he starts working. He has been gambling for more than 50 years. He does not enjoy gambling as a leisure activity, he consumes it compulsively. His fondness for bingo makes him gamble bulimically. Later on, he starts playing slot machines, playing for 6 h a day. However, he does not consume alcohol. He loses large amounts of money. He even steals from his family and his company. He loses up to the floor. He acknowledges having received help from his family, which for him has been his best therapy. The family rejects the game and no member participates in games of chance.

Analyzing the variables that are repeated in the three cases, we can establish a series of similarities and some divergences. All three have gambled all their lives. They have not fallen into gambling after retirement. The cultural factor does not seem to be decisive, but it helps to fall into gambling in some cases. Other times, it generates rejection in the family environment that has been punished by the addiction of the gambler. Gambling problems are generated at an early age. The addiction is maintained throughout life. Gambling addiction takes an important part of the income. One gets to live badly to have more money to gamble.

We can also state that the normalization of gambling is an element of risk. Young people and adolescents are often targeted by the media. Perhaps because of the visible problems it generates. Without downplaying the harm that the world of gambling can do to this age group, the risk is also very high in the group of older adults. There is no single profile of problem gamblers, so it is more difficult to detect problems. In addition, we are dealing with adults, with their own source of income and with the freedom to direct their own destiny. It is therefore difficult to detect cases of addiction and to act accordingly.

4 Discussion

In general, we found more affinities than divergences with the previous papers reflected in the state of the art of this article. We agree with Johansson [22] that there is no single profile of compulsive gambler. We also reaffirm the sociocultural nature of gambling that makes it present in our daily lives [9, 12]. Analyzing the dramas of people who

develop pathological gambling, we agree with Leavens [7] and Medeiros [9] is that it is a public health problem. In our interviews and observation, informants have shown predisposition to gambling from early ages. We agree with Guillou-Landreat [12] on early exposure and availability and proximity of spaces. In general, we found more affinities than divergences with the previous papers reflected in the state of the art of this article.

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Functional Profile of Older People Hospitalized in Long-Term Care: A Study of Probability in Portugal

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Abstract. Several entities and previous studies suggest the study of self-care behavior as an indicator of prediction of care needs, for the reorganization of health care. **Objectives:** i) to identify the determinants that influence the capacity for self-care and ii) to know the profile of probability of dependence in the functional and self-care capacity of elderly people hospitalized in long-term care. **Methodology:** Longitudinal and retrospective study, through analysis of the electronic health records in the GestCare platform of the National Network of Integrated Continued Care in Portugal: Convalescence Units (CU), Medium Term and Rehabilitation Units (MDRU), Long Term and Maintenance Units (ULDM), between 1 January 2008 and 27 February 2017, with a total of 171 414 individuals and multiple assessments of health status. **Results:** Older age (85 years or more), not having attended school, low body mass index, presence of sad or depressed mood were predictive factors for greater deficits in mobility, in activities of daily living, instrumental activities and cognitive status. In the CU the percentile of severe dependence is more likely in women from 88 years of age and in men from 91 years of age. In the MDRU the profile of severe dependence occurs more likely from the age of 75 for men and 80 years of age for women. In the LTMU it is processed from the 81 years. **Conclusions:** Knowing the determinants of self-care capacity and the probability profile of the deficit in functional performance will make possible define priority groups for nursing intervention and improve models of quality and financing, based on gains in health.

Keywords: Aging · Self-care · Functional Capacity · Fundamental Nursing Care Needs · Long-term Care

1 Introduction

The worldwide trend towards to aging and increasing number of chronic diseases, there is a growing concern with the promotion of self-care and self-management of the disease, a central issue in public health [1, 2]. The combination of these two factors has

contributed to the gradual number of situations of dependence on self-care that compromise the maintenance of life, health, and well-being [3], where long-term care represents a structured response [4]. Long-term care takes different designations and organizational models in several countries, in Portugal is classified as Integrated Continuous Care [5, 6]. For the Organization for Economic Cooperation and Development [7], long-term care is a set of interprofessional services, which is required when there is a reduction in functional, physical, or cognitive capacity, which consequently leads to a situation of dependence, which it requires help over a period of time in performing basic daily and instrumental life activities. Dependence is not necessarily restricted to self-care, but it is in this domain that it gains particular importance for individuals and is particularly sensitive for nurses.

In Portugal, the National Network of Integrated Continuing Care (NNICC) was created in 2006, consisting of a set of public and private institutions. There are several types of care in the NNICC, which include inpatient units (Convalescence, Medium Duration and Rehabilitation and Long Duration and Maintenance). These units aim is clinical and functional stabilization, as the promotion of rehabilitation, autonomy and control of the acute or chronic process, with the purpose of preventing and/ or delaying the exacerbation of the condition of dependence [Decree of law No. 101/2006 of 6 of June]. The creation of the Network contributes to a reduction in the number of late hospital discharges, greater efficiency of acute care responses, with the provision of continued support services to people in situations of fragility or with chronic illness.

The functioning of an individual inevitably involves the complex relationship between the health condition and the contextual factors in which he/she lives. If a change occurs in some of the variables, it may result in a decrease in the individual's functioning, leading to the need for help from other people to meet the activities of daily living [8]. Activities of daily living (ADL) and instrumental activities of daily living (IADL) are essential for maintaining self-care and an independent and functional life [9].

Dependence, as the inability to perform one or more activities of daily living without additional or complete help from another individual, may be temporary or permanent, meaning that it can be prevented, reduced, or resolved in an appropriate context and with appropriate assistance [9, 10].

In this context is necessary basic, essential, or fundamental nursing care for the maintenance of health and well-being, which are a set of complex interventions that ensure a person's physical comfort, such as keeping clean, warm, nourished, hydrated, properly dressed, functional and safe. This care includes psychosocial aspects such as feeling calm, adapted, respected, involved, and dignified [11, 12].

The purpose of this study is to recognize the factors that influence the capacity for self-care and to discriminate the profile of probability of dependence in the functional and self-care capacity of elderly people hospitalized in long-term care.

2 Materials and Methods

2.1 Type of Study and Sample

Longitudinal, retrospective study with a sample of 171 414 older adults aged 65 years and over hospitalized in health units belonging to the NNCIHC. These inpatient units

constitute three types of networks: Convalescence (CU), Medium Duration and Rehabilitation (MDRU) and Long Term and Maintenance (LTMU). The Convalescent Units have the objective of clinical and functional stabilization, being more advisable for people recovering from an acute process or decompensation of a chronic disease, with great recovery potential with a predictable stay of up to 30 consecutive days. The Medium Duration and Rehabilitation Units are designed for transitory situations, where, for the promotion of rehabilitation, autonomy, and control of the acute or chronic process, there is a need for hospitalization ranging from 30 to 90 days. The Long-Term and Maintenance Units are intended to ensure care that prevents and/or delays the exacerbation of the dependency condition, with a likely hospital stay of more than 90 days. This time frame is extended given that care is envisaged for people with chronic diseases of slow evolution and with a high degree of complexity, which cannot and are not advised to be provided at home [Decree of law No. 101/2006 of 6 of June].

2.2 Instruments

The Network used a Integrated Assessment instrument, from its creation (2006) to 2017, which aims to identify physical, functional, mental, social disorders and life habits, whose results were crucial for the definition of an individual intervention plan, with an emphasis on maintenance and recovery of capacities. The variables constituting the Integrated Assessment Instrument were analyzed: sex, age, health complaints, nutritional status, falls, locomotion, physical autonomy [13], instrumental autonomy [14], emotional complaints, cognitive status, based on the Mini-Mental State [15], social status and habits [16]. The constituent variables analyzed in big data were according to an elaborated concept map that defines self-care, suggested by the literature [17], and statistically validated in this study.

2.3 Data Collection

Data was collected from the database of the NNICC Medium-Term care and Rehabilitation Units for the period between January 1, 2008, and February 27, 2017. These records were made by health professionals from these units at national level. Assessment data was collected every 30 days to assess the evolution of the functional profile. All Units of this typology in Portugal were included.

2.4 Statistical Analysis

To analyze whether the mobility, basic activities of daily living, instrumental activities and cognitive status indices differed in two or more populations, a simple parametric analysis of variance (ANOVA for short Analysis of Variance) was performed. To carry out the One-way Anova, the assumption of normality of the distributions was verified, however it is important to mention that, as this is a large number of cases ($N > 30$), the breach of this principle does not have serious consequences, invoking for this the effect of the central limit theorem [18]. This analysis was performed on age classes, schooling, body mass index and emotional state, given that they are quantitative variables (likert-type scale) in K samples (3 or more). The *t*-Student test also serves to test whether or not

the means of two populations are significantly different, also requiring that the dependent variables have a normal distribution, with homogeneous variances. This test was used to compare the mean of a quantitative variable (synthetic index) with two interdependent samples (sex) [19]. Ordinal regression with the *probit* link function was used to assess whether age and sex had a significant effect on the probabilities related to the type of dependence. The link function was chosen based on the frequency distribution criteria of the classes of the dependent variable “degree of dependence [19].

2.5 Ethical Procedures

This study was conducted in accordance with the guidelines of the Declaration of Helsinki and was approved by the Ethics Committee of Scientific Research in the Areas of Human Health and Welfare of the University of Évora (report number, 17036; date of approval, 26 April 2017).

3 Results

3.1 Sociodemographic and Clinical Characteristics

The age group with the highest number is 1 from 75 to 84 years old. The youngest group (65 - 74 years old) is more concentrated in the CU (29.0%) and the most advanced age group, that is, being 85 or more years is more prevalent in LTMU (37.7%). It appears that females are the most hospitalized at the NNICC. The most frequent marital status is married, followed by widowhood, however it is important to note that there is a higher percentage of individuals without a spouse. The absence of teaching attendance is more expressive in LTMU (42.7%), however, the high percentage of people with low education is transversal to all typologies. The regions of Portugal with the highest number of hospitalized elderly people were Lisbon and Vale do Tejo e North (Table 1).

The relationships between levels of dependency and the distribution of people by level of complete/severe dependency were analyzed, in the tree typologies (Table 2).

In CU the results obtained suggest that, as age increases the probability of observing higher order classes increases, that is, the probability of observing a higher degree of dependence increases ($B_{Age} = 0.043$; $p < 0.001$). With regard to sex, the results obtained suggest a greater probability of observing a greater type of dependence in women compared to men ($B_{Gender(Female)} = 0.101$; $p < 0.001$), although this difference is slight. In the case of women, from 88 years of age onwards, the type of addiction profile that is most likely to occur is “Severe/Complete”, while for men the same happens, but from 91 years of age (three years later) (Fig. 1).

Table 1. Sociodemographic characteristics of people aged 65 and over hospitalized in the National Network of Integrated Continuing Care in Portugal.

Typologies	CU	MDRU	LTMU
Sociodemographic variables	N (%)	N (%)	N (%)
<i>Age (years)</i>			
65-74	15320 (29,0)	14498 (24,6)	10591 (17,8)
75-84	24987 (47,2)	28414 (48,1)	26498 (44,5)
≥ 85	12578 (23,8)	16101 (27,3)	22427 (37,7)
<i>Sex</i>			
Female	32535 (61,5)	34215 (58,0)	34400 (57,8)
Male	20350 (38,5)	24798 (42,0)	25116 (42,0)
<i>Marital status</i>			
Single	6193 (13,2)	6332 (12,0)	7420 (13,8)
Married	20763 (44,4)	24665 (46,6)	24609 (45,7)
Domestic partnership	454 (0,3)	167 (0,3)	167 (0,3)
Divorced	2018 (4,3)	2166 (4,1)	1598 (3,0)
Widowed	17578 (37,6)	19510 (36,9)	19988 (37,1)
Unknown	109 (0,2)	90 (0,2)	97 (0,2)
<i>Education (years)</i>			
No education	8244 (31,5)	10933 (34,1)	14419 (42,7)
1 to 6	15802 (60,4)	18564 (57,8)	17513 (51,9)
7 to 12	1087 (4,2)	1346 (4,2)	962 (2,8)
≥ 13	1047 (4,0)	1248 (3,9)	869 (2,6)
<i>Region of Portugal</i>			
Alentejo	4913 (9,7)	4668 (8,3)	5584 (10,1)
Algarve	3659 (7,2)	2761 (4,9)	2517 (4,5)
Centro	11937 (22,6)	15233 (27,2)	15632 (28,1)
Lisboa e Vale do Tejo	11362 (22,4)	18663 (31,6)	15847 (28,5)
Norte	18805 (37,1)	14778 (26,3)	15982 (28,8)

In MDRU for both women and men, the probability of a “Mild” type of addiction profile is always lower than either of the other two types of profiles. In the case of men, from the age of 75 onwards, the type of dependence profile that occurs with greater probability is “Severe/Complete”; (iii) in the case of women, a similar scenario is verified, although around 5 years after the one referred to for men, that is, close to 80 years of age (Fig. 2).

In LTMU, the probability of a mild dependency profile is always lower than any of the other two types of profiles; from the age of 81, the type of dependence profile that occurs with greater probability is “Severe/Complete”. No statistically significant differences were found between genders (Fig. 3).

Table 2. Needs of nursing care by levels of dependency in the typologies of NNICC.

Levels of dependency	Needs of nursing care (Orem, 2003)	Selfcare determinants	Typologies of NNICC
Complete/ severe dependence	Total compensatory nursing care	<ul style="list-style-type: none"> •85 years old •No schooling •Low body mass index •High level of anxiety and depressed mood 	<ul style="list-style-type: none"> •CU: 29,6% •MDRU: 47,1% •LTMU: 61,1%
Moderate dependence	Partial compensatory nursing care	<ul style="list-style-type: none"> •65–84 years •1–6 years of education •Normal body mass index •Moderate level of anxiety and depressed mood 	<ul style="list-style-type: none"> •CU: 52,1% •MDRU: 43,1% •LTMU: 30,8%
Mild dependence	Psychoeducational nursing care	<ul style="list-style-type: none"> •65–74 years •13 or more years of education •Low body mass index •High levels of anxiety and depressed mood 	<ul style="list-style-type: none"> •CU: 18,3% •MDRU: 9,8% •LTMU: 8,1%

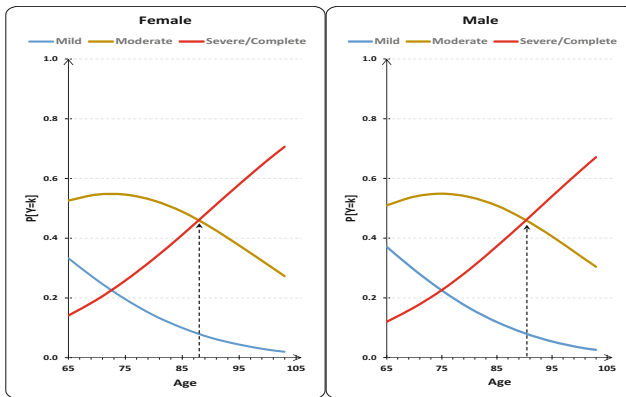


Fig. 1. Evolution of the probabilities for the types of mild, moderate and severe dependence, in the case of women (left) and men (right) ($\chi^2(2) = 274.822; p < 0.001; R_{MF}^2 = 0.096; R_N^2 = 0.132; R_{CS}^2 = 0.129$) in CU.

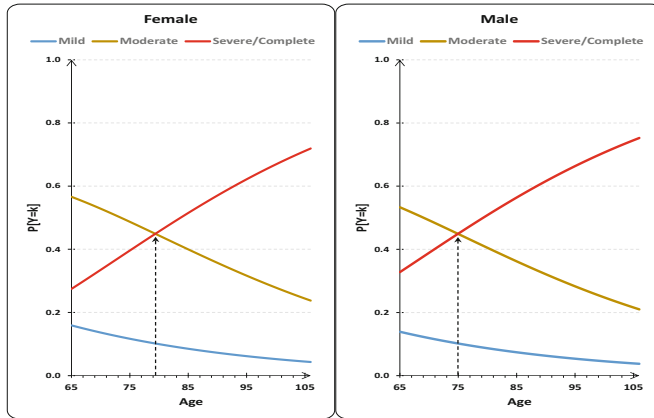


Fig. 2. Evolution of probabilities for mild, moderate and severe types of dependence, for women (left) and men ($\chi^2(2) = 154.833; p < 0.001; R^2_{MF} = 0.089; R^2_N = 0.187+; R^2_{CS} = 0.159$) in MDRU.

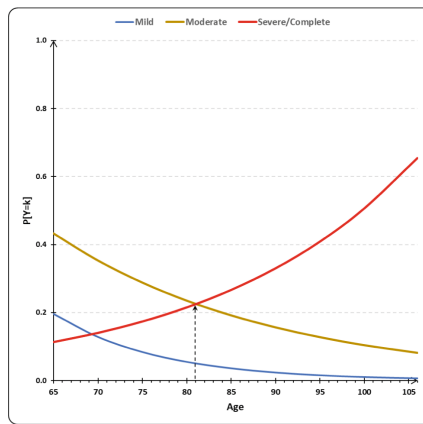


Fig. 3. Evolution of probabilities for mild, moderate and severe/complete dependence types ($\chi^2(2) = 9.743; p = 0.008; R^2_{MF} = 0.076; R^2_N = 0.111; R^2_{CS} = 0.105$) in LTM.

4 Discussion

We highlight the higher percentage of women (59%), which may be related to their greater longevity, compared to men in Portugal [20]. Globally, women survive 4.8 years longer than men [21]. Regarding marital status, there was a predominance of widowhood and single status among females, which may also be linked to higher average life expectancy. In Europe (EU-28) in 2013, average life expectancy at birth was estimated at 80.6 years, more particularly 83.3 years for women and 77.8 years for men [22]. In Portugal, in 2019, the average life expectancy at age 65 for women is 21.1 years, while for men it is 17.8 years [23]. This study confirms the increasing feminization as age

advances, reaching its greatest magnitude after 85 years of age, similar findings were found in the investigation by Goes *et al.* [24].

The low level of education present in most elderly people hospitalized in the Network was also identified in previous studies as higher risk factors for long-term care needs [25]. The lowest socioeconomic level is identified as a disadvantage factor in accessing information and health care, which leads to a negative perception of health status and increases the likelihood of decline in functional capacity [26, 27].

The highest concentration of elderly people with moderate dependence occurred in the Convalescence Units and severe dependence occupied a more pronounced place in the Long Term and Maintenance Units. In this last typology, it was where people always registered the most deteriorated emotional state, related to the highest rates of addiction in all domains and slower recovery. Concomitantly, individuals with mild dependence, who are a small slice of the studied population, assume an inverse trend, being more prevalent in Convalescence Units.

Li *et al.* [28] underline the high prevalence of depressive symptoms associated with cognitive deterioration, which result in greater commitment to self-care ability. Their study was carried out in the community, with 1034 individuals aged 65 or over, covering only those with diabetes mellitus. In relation to depressed mood and depression, there seems to exist evidence in which it has been consistently demonstrated as a risk factor for loss of functionality in the elderly [29].

Low body mass index was consistently related to a higher degree of dependence in all domains. In long-term care, Bürge, Gunten & Berchtold [30] examined the causes that were associated with a significant variation in the performance of basic life activities, in a retrospective study between 1997 and 2007. Changes in body balance, incontinence, Impaired cognition, low body mass index, loss of vision and hearing, and presence of depression were, in hierarchical order, significant risk factors for degradation in the performance of daily activities. Other studies show a close relationship between nutritional status, basic life activities and cognitive function, with low weight and malnutrition being more associated with the deterioration of mental functions [31, 32].

As age advances the probability of more dependence increases, in the three typologies. This finding has been documented in several previous studies. In Convalescence Units, women are more dependent than men. From the age of 88 in women, the profile of severe dependence is the most likely, in men it appears later, at 91 years of age. In the Medium Duration and Rehabilitation Units the opposite phenomenon happens, men are the most dependent. In men, from the age of 75 years, the type of dependence profile that occurs with greater probability is the severe one and for women it is close to 80 years of age, with a difference of 5 years. Greater dependence is consistently more reported in women than in men [33–36], but when there is simultaneous depression or cognitive decline, men show a greater predisposition [37–41].

In the Long-Term and Maintenance Units, it is at 81 years of age that the profile with the highest probability is that of severe dependence, with no statistically significant differences being found for gender. A better understanding of the functional capacity and associated risk factors provide indicators that enable the implementation of an early intervention.

5 Conclusions

The rehabilitation care during hospitalization in care units which integrated long-term care network in Portugal contribute to a decrease in mobility dependence, ADL, IADL and improvement of cognitive status. It is also concluded that in the group of severe or complete dependence are composed by older adults over 85 years old and those who did not attend school, have low body index and high levels of anxiety and depressed mood. This study focuses the importance of education, body mass index and mental health as facilitators of rehabilitation and recovery from acute health/illness situations, providing a contribution to clinical practice.

We suggest that future studies should assess the mental health of people undergoing rehabilitation, given the importance it may have for physical rehabilitation and the impact of early intervention based in the profile risk of deterioration.

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Institutional Review Board Statement: The study was conducted according to the guidelines of the Declaration of Helsinki and approved by the Ethics Committee of Scientific Research in the Areas of Human Health and Welfare of the University of Évora (report number 17036 and date of approval 26 April 2017).

Conflicts of Interest. The authors declare no conflict of interest.

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Validation of the Medication Management Ability Assessment Tool (MMAA) for the Portuguese Older Adults

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Abstract. This study aimed to validate the Medication Management Ability Assessment (MMAA) and determine the level of functional ability of older adults to manage a simulated therapeutic regimen, understand their main limitations when facing alterations and determine the relationship between the functional ability to manage medication and cognitive function.

The adaptation was initiated with the translation and back-translation by four independent bilingual experts. The cultural dimension was developed through an external experts meeting, with a screening of concepts and constructs of the tool. The pilot study of MMAA-PT was run on a sample of 100 Portuguese community-dwelling elders. Three additional instruments were used to characterize the sample and to convergent analysis, the Mini-Mental State Examination (MMSE), the Clock Drawing Test (CDT), and the Instrumental Activities of Daily Living (IADL). Descriptive analysis, correlations, and convergent validity were conducted using Microsoft Office Excel (2022) and SPSS Statistics (v.27).

Of the 100 subjects, 70% were women, and the general mean age was 75.44 (± 6.68) [65.00–94.00] years. The MMAA-PT mean score was 18.75 (± 8.72) [0.00–33.00]. The convergent validity of the MMAA-PT was verified using the *Spearman* coefficient, with MMSE and CDT. It obtained an *r*-value of 0.44 in both correlations ($p < 0.001$), being, therefore, two significant positive correlations

of moderate strength, which indicates that better scores on the MMAA-PT are associated with better cognitive function.

A European Portuguese version of the MMAA with acceptable convergent validity was obtained, which can be used in future research and clinical settings, namely in the medication reconciliation process.

Keywords: Functional ability · Medication management · Medication reconciliation · MMAA-PT · Older adults

1 Introduction

Most older adults are unable to take their medications as prescribed [1, 2]. Taking the daily therapeutic regimen can become a complex process and can be affected by systematic errors, namely due to a gradual loss of functional ability to manage medication [3–5]. Thus, Maddigan et al. (2003) defines the functional ability to self-manage medication as the cognitive and physical capacity to self-administer/take medication according to the prescription received [6].

Although the ability to manage medication may be reduced, it is known that performance can be enhanced [7, 8]. It can be improved with interventions and the use of technology, namely with the introduction of supports for daily activity, whether human (e.g., caregivers or health professionals), physical (e.g., pillboxes), or digital devices (e.g., digital apps) [8, 9].

In this context, evaluation of the older adult's ability to manage their medication can be a significant step in identifying inabilities and potential needs. There are several instruments to evaluate the functional capacity of the elderly for the management of their medication [10]. The most well-studied are the Drug Regimen Unassisted Grading Scale (DRUGS), developed by Edelberg et al. [11] and validated for Portuguese older adults by Advinha et al. [12], and Medication Management Ability Assessment (MMAA), which was created by Patterson et al. (2002), using a simulated medication regimen, originally developed to assess patients with nervous system conditions, such as schizophrenia [13].

That the MMAA uses a simulated medication regimen for the evaluation of the self-ability to manage medication can be very important, one of the identified causes of non-intentional nonadherence and consequent errors are medication discrepancies during transitions of care – such as home, hospital, residential care facilities and appointments with different healthcare professionals – where patient's healthcare is provided. During those transitions, some medication reviews and reconciliation can happen [14, 15].

These changes may contribute to an increase in the complexity of therapeutic regimens, leading to non-adhesion, which may be responsible for complications of the health condition, hospitalizations, increased health costs, and ultimately death [16].

Additionally, the ability to adapt to a new therapeutic regimen seems to be also related to cognitive ability, because with the reduction of this, may occur difficulty in performing complex tasks, as well as recent memory loss, something that is fundamental for the performance of medication management [17, 18].

Face to these questions, it is important to evaluate the older adult's ability to manage a simulated medication regimen, representing potential new therapeutic schemes and alterations.

The main objective of this study was to perform the linguistic and cultural adaptation and validation of the MMAA for Portuguese older adults.

2 Methods

Instruments. MMAA was developed by Patterson *et al.* (2002) [13], to assess the ability of outpatients with schizophrenia to manage and adhere to their medication regimens. The tool was adapted to the Portuguese older population (MMAA-PT) with original author authorization. It is based on four simulated medicines: Parlenol 10 mg, BRB 15 mg, Cyclomeovan 100 mg, and Linophen 15 mg. The simulated dosages are shown in Table 1.

Table 1. Simulated names and dosages of medicines used in MMAA-PT

Name	Dosage
Parlenol 10 mg	Take two capsules twice a day with food
BRB 15 mg	Take one capsule 3 times a day
Cyclomeovan 100 mg	Take two tablets three times daily on an empty stomach (at least 1 h before or 2 h after a meal)
Linophen 15 mg	take two capsules 4 times a day

Parlenol 10 mg consisted of red and blue capsules, BRB 15 mg of white capsules, Cyclomeovan 100 mg of white oval tablets, and Linophen 15 mg of green capsules.

To carry out the interviews, the four medications were laid out on a table and the mode of administration was explained to the participants, mentioning that there was no need to memorize anything because the dosages of the medications could be consulted whenever necessary during the task.

The participants were then asked to explain how they would manage this simulated medication regimen throughout the day and the task was timed to 15 min for all participants, after which time the test was concluded.

The total score is obtained through the sum of the scores of the developed tasks (1-point to correct action, and 0-point to incorrect action).

The MMAA-PT can be made available by the authors, upon request by e-mail.

For this study, in addition to the MMAA-PT, three other instruments were used, the Mini-Mental State Examination (MMSE) [19] and the Clock Drawing Test (CDT) [20–22] to assess cognitive function, as well as the Instrumental Activities of the Daily Life (IADL) [23, 24], respectively to assess the cognitive and instrumental function.

Study Design and Data Collection. The adaptation of MMAA started with the linguistic dimension, through a translation and back-translation performed by four independent bilingual experts (two Portuguese natives and two English natives). The linguistic screening and the cultural adaptation were developed by one-way expert analysis and an external expert meeting to check the operational, conceptual, and cultural requirements.

The experts involved in this process have more than 15 years of professional experience [25, 26].

The cultural pre-test was performed with ten older adults to detect and modify words or expressions that were difficult to understand and to perform the face validity of the tasks and adaptations made in cultural contents, such as type of packaging and physical characteristics of medicines like color and form. An overview of the adaptation and validation process is provided in Fig. 1 [12].

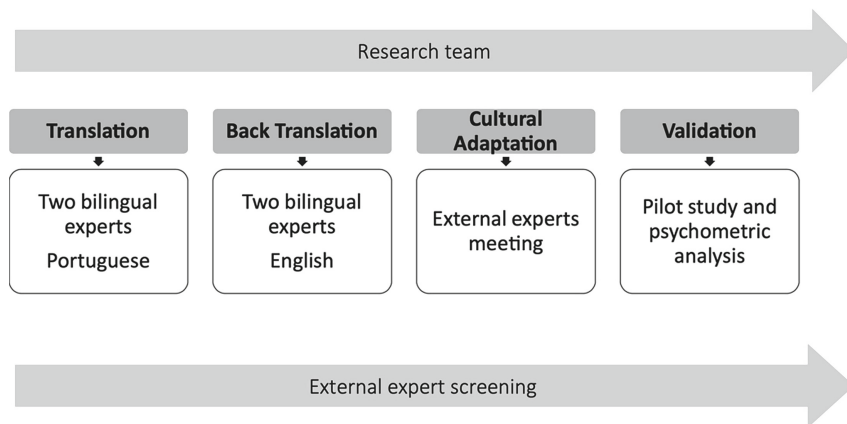


Fig. 1. Overview of the linguistic/cultural adaptation and validation (Source: Advinha, A. M. et al. (2016) [12])

The pilot study and convergent validity were based on a pre-final version of MMAA-PT and carried out in community-dwelling older adults, in the Alentejo region, Portugal. Test data were collected from July and October 2021.

Sampling. A purposive sample was used in this study. Eligibility criteria included subjects 65 years or older, community-dwelling, Portuguese native, taking at least one medication chronically, and without visible signals of dementia.

To maximize the sensitivity of the validity analysis, the sample was calculated for a ratio of 10 subjects for each assessed item (10 subjects \times 10 items) [25–27]. A researcher interviewed older adults in community pharmacies who had accepted to participate in the study. Eligible participants were consecutively recruited until complete the total sample size ($n = 100$). Consenting participants ($n = 100$) answered the questions and complete the tasks contained in the adaptation and validation of MMAA-PT.

Data Processing. Descriptive statistics were computed for demographic and health variables. The *Spearman* correlation coefficient was calculated to analyze the potential associations and convergent validity. The normality was verified based on the Kolmogorov-Smirnov test with Lilliefors correction.

Statistical analysis was conducted using Microsoft Office Excel (2022) and SPSS Statistics (v.27). A significance level of 5% was used for inferential analysis.

Ethics Statement and Ethics Approval. This study was approved by the Ethics Committee of the University of Evora (ID 14009). All participants were informed about the study objective and gave their informed consent for participation.

Consent to Participate/Publication. All participants were informed about the study objective and gave their informed consent for participation.

3 Presentation and Discussion of Results

The adaptation of MMAA was performed through a forward and backward translation cycle. It started with a one-way translation of the original tool (English [USA]) to the target language (Portuguese [Portugal]) by two blinded bilingual experts, Portuguese natives. From the analysis of the forward translation, a first synthesis was obtained, which was used to blind back-translation by two bilingual experts, English natives.

A second synthesis was conducted by a one-way expert analysis after the comparison of back-translations and the original tool. This synthesis was also used to start the cultural adaptation through a committee meeting to discuss operational, conceptual, and cultural questions. The committee was constituted by a multidisciplinary expert group: one nurse, one physician, one pharmacist, one psychologist, one senior researcher, and the main researcher of the study.

The preliminary version of the MMAA-PT was specifically analyzed for concepts, structure, and applicability. The face validity and pre-test were run in a purposive sample of ten elders in community pharmacies, in the Alentejo region (Portugal). Minor alterations like some words, the packaging, and the colors and medicines forms were changed to achieve cultural, and conceptual equivalence.

Of the 100 participants, 70% were women. The mean age was 75.44 (± 6.68) [65.00–94.00] years. Most older adults had a low level of education: 9% did not attend school, 68% attended school in a period of 1 to 4 years, 17% 5 to 9 years, 2% 10 to 11 years, and 4% 12 or more years.

The average scores obtained for MMSE, CDT, and IADL were respectively 25.18 (± 3.97) [11.00–30.00], 51.04 (± 24.47) [0.00–83.00], and 20.99 (± 4.98) [6.00–24.00].

The MMAA-PT total average score was 18.75 (± 8.72) [0.00–33.00]. For each medicine, an average score of 4.55 (± 2.11) [0.00–7.00] was obtained in the simulated intake of Parlenol; 4.47 (± 2.48) [0.00–7.00] in simulated BRB intake; 5.24 (± 2.95) [0.00–10.00] on simulated Cyclomeovan intake; and 4.53 (± 2.89) [0.00–9.00] in simulated Linophen intake.

Correlations were calculated between MMAA-PT and MMSE scores and between MMAA-PT and CDT scores, obtaining equal *r*-values, corresponding to 0.44 ($p < 0.001$). Thus, lower scores on the MMAA-PT correspond to lower scores on the MMSE and CDT, that is, lower cognitive capacity.

The convergent validity was also verified using the *Spearman* coefficient, between the MMAA-PT and the MMSE and between the MMAA-PT and the CDT.

Thus, it is expected that with the increased cognitive capacity, there will also be greater capacity on the part of the older adults to manage a new therapeutic regime different from the one they are used to [28].

This question can assume special relevance in the transition of care, namely in the context of medication reconciliation – a process in which the transference of all the accurate and complete medication information is correctly done to the professionals involved in the patient's healthcare strategy during all the transitions between the healthcare facilities and other possible patient's physical locations. Contributing to this fact, the evidence shows that medication reconciliation must be based on three fundamental pillars: i) building a list of the patient's medication and checking its accuracy; ii) reconciling the list with the prescribed medication to identify discrepancies and resolve them, and iii) communicating the accurate patient's medication list [29–32].

A Cochrane systematic review identified 25 randomized trials involving 6995 patients and concluded the evidence of medication reconciliation in reducing the number of discrepancies, and its impact on clinical outcomes such as preventing side effects or hospital readmissions is uncertain [30].

One of the difficulties found in the medication reconciliation process is obtaining an accurate and complete patient medication list as it depends on the patient's capacity and willingness to provide this information [32].

On the other hand, even if the medication reconciliation process ends up with an updated list of the therapeutic regimen the adherence depends on the patient's desire and functional capacity to fulfill all the cognitive and physical challenges involved. Older adults represent an important risk group for non-adherence (not intentional) due to their lower and gradually diminished functional capacity. Disability is highly prevalent in people aged 60 or older and the main causes are related to visual acuity, dementia, hearing loss, and osteoarthritis. The non-intentional lack of adherence to the therapeutic regimen caused by a decreased patient's functional ability may lead to medication-related problems which can be avoided or minimized. Even when there is a disability it is known that the patient's performance can be improved. Therefore, the evidence shows that it becomes important to access the functional capacity using a validated tool to identify the difficulties and requirements of the patient regarding better medication self-management [28, 33, 34]. Thus, it seems important to consider the patient's functional capacity assessment through instruments like MMAA-PT as part of the standard medication reconciliation practice to identify the patient's – namely older adults – needs and doing so improve the intervention's strategy performance and outcomes.

The study presents some limitations. Although the ratio of subject/item has been maximized, the sample size and sampling do not guarantee the representativeness of the general older population. This fact is a limitation to the extrapolation of the results. In the future, a study with a large and representative sample should be promoted. Another limitation was the absence of retesting, which can be explained by the pandemic restrictions. Although the retest could have associated bias, namely related to the learnings during the tool application, it constitutes the main way to develop some psychometric analysis, especially the consistency between responses. However, in the case of the MMAA-PT, the authors consider that it is controversial because the starting point of the tool application is an explanatory introduction to integrate the subject in a simulated context and this can be representing biased results between different time points. In this case, new methodological approaches are needed to contribute to a more complete psychometric analysis.

4 Conclusions

A European Portuguese version of the MMAA was obtained, with acceptable linguistic/cultural characteristics and convergent validity with cognitive measures. The MMAA-PT can be used in clinical (home or healthcare services) and research settings, namely in medication reconciliation.

The MMAA-PT may be an important tool in medication management ability assessment, specifically to identify problems related to cognitive status, such as the capacity of older adults to integrate new information about their chronic medication regimen, to deal with new medications, or completely new medication regimens.

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Patient-Centered Care Models for Institutionalized Older Adults Requiring Palliative Care: A Systematic Review Protocol

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Abstract. Introduction: The increase of chronic diseases, multimorbidity, functioning changes and loss of autonomy, associated with the absence of caregiver and community support, lead to institutionalization of older adults who will require palliative care. The integration of accessible palliative care is currently a wide priority. This study aims to answer the question: What are the palliative care needs of the institutionalized older adults? So, the aim is to synthesize scientific evidence about Patient-Centered Care Models for institutionalized older adults requiring palliative care.

Methods and analysis: The protocol follows the methodology PRISMA and uses five databases, CINAHL Plus with Full Text, MedicLatina, MEDLINE with Full Text, Academic Search Complete and Psychology and Behavioral Sciences Collection. The search strategy includes the following MeSH or similar terms: “palliative care”, “end of life”, “palliative nursing”, “long term”, “nursing home”, “residential care”, person centered care”, “patient centered care” and “client centered care”. The search, analysis, extraction and synthesis of data is conducted by two independent reviewers and a third will solve disagreements. All studies written in English, Portuguese, Spanish or German conducted between December 2017 and August 2022 will be included regarding diagnostic evaluation, which identifies the need for palliative care, care planning and implementation of interventions.

Conclusion: It is hoped that this protocol will facilitate the systematic review and contribute to future studies within the scope of models of care centered on the institutionalized older adults with need of palliative care.

Keywords: “palliative care · “nursing home · person centered care

1 Introduction

The population aged 65 and over, on average, has almost doubled in OECD Countries. In the 38 member countries, more than 232 million were aged 65 or over in 2019, and

more than 62 million were at least 80 years old. In five countries (Portugal, Greece, Italy, Korea and Japan), the percentage could exceed one-third of the population by 2050 and more than one in eight people will be 80 or older [1, 2].

The population resident in nursing homes is increasingly composed of frail older adults with chronic and progressive diseases [3–6]. However, knowing the real needs of this population is a challenge given the lack of systematic studies that allow for the restructuring of organizational and health policies and care planning, bearing in mind the users' characteristics[7].

A study conducted in Portugal, with a sample of 586 subjects, 484 of whom were institutionalized, revealed a mean age of 85.79 years, with most of the sample being composed of women (69.6%). In the functional profile, the domain of self-care was the one that showed the worst results and 56.6% of the institutionalized participants had cognitive deterioration.[8] In another study, 68.2% of older adults had 2 or more nosological diagnoses, the most frequent being circulatory system diseases, followed by nervous system diseases (including dementias), musculoskeletal system, neoplasms, endocrine, nutritional, and metabolic diseases, and mental and behavioral disorders, and 70.12% had multimorbidity [3]. Underlying this reality is the worrying prevalence of chronic diseases that manifest themselves as multimorbidity [7]. Although it is still little consensual, multimorbidity is usually defined by the cooccurrence of several chronic diseases [8–10]. Reality that is accentuated with advancing age [11, 12], becoming a public health concern associated with increased health needs [9, 10, 12].

The literature shows that care in the Residential Structures for the Older Adults is predominantly provided by direct action assistants and auxiliaries, unqualified professionals with low levels of education [7, 13], factors that will contribute to the overload of the health systems, which highlights the hyperuse of emergency services [14]. Data confirmed by a study which sought to identify which components of care models influenced functionality and concluded that factors such as a good inter and transdisciplinary management, well-defined admission criteria, and individual care plans focused on the functioning improvement of the older person are essential components to adopt a care model promoting self-care in long-term care settings [15].

The suffering of the institutionalized person, associated with the presence of physical and psychological symptoms, resulting from the progression of multimorbidity and loss of functioning, [5, 6, 10, 16], and social and spiritual problems, associated with limitations in sharing feelings, loss of meaning in life itself, and breakdown of close ties [5, 16, 18] reveal the need to integrate palliative care as a way to ensure symptom relief and well-being in this phase of great vulnerability. The WHO estimates that only 1 in 10 people receive palliative care according to need [1]. Each year, it is estimated that more than 56.8 million people, including 25.7 million in the last year of life, require palliative care [2, 19].

The OECD, and the Strategic Plan for the Development of Palliative Care (PEDCP), recognizes the relief of suffering (physical, psychological, social, or spiritual), as a global ethical responsibility, highlighting the relevance of the integration of palliative care in all care settings (home, Palliative Care, CCI, HSC, PHC) as a crucial part of integrated and person-centered health services [1, 2, 20]. Person-centered care can be understood as the provision of health care that respects the individual preferences and needs of patients.

The patient's life history, values and beliefs are considered, and the person starts to take an active role in their clinical decision-making process [21, 22].

Objective:

To synthesize the scientific evidence about models of care centred on the institutionalized older adults with need of palliative care.

Review Question:

This review will be undertaken to answer the following question: Which models of care/interventions focused on the institutionalised older person recognise/consider and answer the need for palliative care?

2 Methods and Analysis

This protocol was developed in accordance with Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) and was registered in the International prospective register of systematic reviews (PROSPERO) under registration number: CRD42022373388.

Considering that the scope of this study is very specific and still understudied, we chose to include in this review primary empirical quantitative studies: cross-sectional, longitudinal, observational, or experimental studies.

This protocol was developed in September 2022. We will start data analysis in December 2022 and will completed the systematic review by the end of April 2023.

2.1 Eligibility Criteria

The inclusion criteria are adult patients aged 60 years and over, institutionalised in nursing homes, receiving palliative actions. For example, all studies involving participants, institutionalised, targeted by palliative interventions will be included. The aim is to collect as much information as possible, as such reviews are still scarce in the scientific literature.

2.1.1 Intervention

The review will include studies on person-centred interventions aimed at minimising symptomatology, relieving suffering, promoting quality of life and respecting the dignity of older adults institutionalised in care homes, in any geographical area.

2.1.2 Comparison

This review will include studies with or without a comparison group.

2.1.3 Primary Outcome

The main objective will be to synthesise the data on strategies for diagnostic assessment, care planning and implementation of interventions with an impact on the quality of life and relief of suffering of the institutionalised older person, that is, on the care process in this context.

2.1.4 Study Design

This review should include primary empirical quantitative studies: cross-section, longitudinal, observational or experimental.

2.1.5 Context

All studies related to diagnostic assessment, care planning or intervention strategies focused on adults aged 60 years or older, with uncontrolled symptoms and/or suffering, only in institutionalised nursing homes, will be included in this review.

2.2 Search Strategy

2.2.1 Data Sources

In the research strategy, the aim is to carry out a broad literature search and the databases to be consulted will be: CINAHL Plus with Full Text, MedicLatina, MEDLINE with Full Text, Academic Search Complete and Psychology and Behavioral Sciences Collection

2.2.2 Search Terms

The research will include the combination of three key concepts according to Medical Subject Headings (MeSH) terms: (“palliative care”) OR (“end of life care”) OR (“palliative nursing”) AND (“long term”) OR (“nursing home”) OR (“residential care”) AND (“person centered care”) OR (“patient centered care”) OR (“client centered care”). The strategy will be adapted according to each database and will be restricted to the period between December 2017 and September 2022, in English, Portuguese, Spanish.

The employed search terms and the search strategy used for each database are specified in the Supplementary Materials.

2.3 Data Collection and Analysis

2.3.1 Selection of Studies

The studies resulting from the search in each database will be exported to Mendeley and duplicates will be removed.

3 Conclusion

Given the change in care that occurs in older adults who live in nursing homes, it has become a priority to identify the models of care that accurately respond to this population regarding palliative care. This kind of identification will allow us to clarify which the needed model components are, making it possible to build indicators centered in the person and its well-being.

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