Chapter 20
Telenephrology: A Resource for Universalizing Access to Kidney Care, Perspectives from Latin America

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20.1 Introduction

In the last 20 years, the use of telehealth and telemedicine has had an explosive growth worldwide [1–6]. Through these digital modalities, care and/or actions are carried out that allow evaluating, diagnosing, treating, controlling, and educating patients, family members, and health teams. The growing number of publications related to telemedicine, and in particular telenephrology, reflects the growing interest in incorporating information and communication technologies (ICTs) in the health area [7–13].

In the nephrology community, it becomes of special interest to know the benefits that telenephrology could provide in the prevention and comprehensive approach to chronic kidney disease (CKD), one of the main health challenges that impacts public health worldwide [14–19]. The growing demand for care and treatment of people with CKD, associated with the shortage of nephrologists, requires the search for and implementation of innovative models that allow a timely response to these demands [14–21].

In this chapter, a proposal is presented in order to use telenephrology as an articulating instrument in a systemic strategy to address CKD in a health network, supporting the integration and coordination between primary health centers (PHCs) and the most specialized levels.

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It is expected that digital modalities favor early diagnosis of the disease, timely treatment, and quick access to specialized care for people with CKD.

The proposal is based on the premise of person-centered care and telenephrology (TN) experiences reported in publications of the specialty and in Latin American countries, some already consolidated and others under evaluation as proposals for development and public policies in renal health [7, 18–21].

Likewise, some telematic continuing education experiences carried out by regional scientific societies and the use of ICTs during the COVID-19 pandemic are reported, a period in which a more frequent and widespread use of telemedicine has been observed.

20.2 Chronic Kidney Disease: A Silent Epidemic

CKD is a public health problem with an alarming increase in its incidence worldwide, which is associated with the sharp prevalence of the two highest-risk diseases: high blood pressure and diabetes mellitus, and the low levels of control of these pathologies at a world range [14–18]. In this regard, health organizations and international scientific societies have pointed out the urgent need to implement public prevention policies [14, 16, 18, 22–27].

There is evidence and consensus that early diagnosis and timely treatment of CKD are especially important in the evolution of the disease, since both actions can slow down or stop progression to advanced stages, along with preventing complications, reducing associated cardiovascular events, and avoiding the need for renal replacement therapy (RRT) [14, 22–27].

According to the Kidney Disease Improving Global Outcomes (KDIGO) classification, most guidelines recommend that patients with CKD stages 1 to 3a should be monitored in PHCs and those in advanced stages 3b to 5 should be referred to a nephrologist for more specialized study and treatment [14–19, 24–27].

Compliance with this last recommendation is limited in many countries, due to the lack of specialists reported worldwide, being more critical in low- and middle-income countries [16, 18, 28–30]. The shortage of specialists makes it necessary to prioritize in-hospital nephrology care and postpone the evaluation of patients referred from primary care, with the consequent increase in waiting lists and delay in the timely diagnosis and treatment of the disease.

In Latin America, CKD is also one of the main health challenges affecting the quality and life expectancy of people and the management of health systems in the region, ranking second as a cause of quality-adjusted years lost [18].

Unfortunately, only isolated epidemiological data are available on the prevalence of CKD in sporadic population surveys in some Latin American countries. Available information comes from data obtained from the ERC and/or RRT records. Since 1991, the Latin American Registry of Kidney Dialysis and Transplantation

(RLDTR) has collected data on patients undergoing dialysis or transplant therapy in countries affiliated with the Latin American Society of Nephrology and Hypertension (SLANH) [31]. Its latest report, in 2019, describes a sustained increase in prevalence, with currently more than half a million patients receiving RRT in Latin America, of which 150,000 people were admitted in the last 10 years [18, 30–32]. This access to RRTs is not homogeneous, and there are great inequities among the different countries, but also within countries [18]. Access to RRT in Latin America is strongly linked to the income level of the countries: in those with high income, more than 75% of patients have access to RRT, while in those countries with medium or low income, the percentage of patients that have universal access to RRT is less than 20% [18].

Regarding the diseases with the highest risk of developing CKD, diabetes mellitus (DM), and arterial hypertension (HBP), both show an alarming growth in Latin America in the last 20 years. Diabetes mellitus (DM) is one of the main health problems in Latin America and is the fourth cause of loss of healthy life, reaching the first place in several countries of the region [33]. The number of people with DM has tripled in the region since 1980, and it is estimated that of the 33 million who currently suffer from it (excluding Mexico), the prevalence will reach 49 million in 2045. The increase in prevalence has been greater and faster in low- and middle-income countries than in higher-income countries (https://diabetesatlas.org/idfawp/resource-files/2021/07/IDF_Atlas_10th_Edition_2021.pdf).

In turn, between 20% and 40% of the adult population in the region suffers from hypertension (in some countries this percentage reaches 48%). This figure implies that around 250 million people suffer from high blood pressure (https://www.paho.org/es/temas/hipertension).

Along with the above, the lack of specialists reported worldwide reaches critical levels in some Latin American countries. In the last report presented at the SLANH 2019 Congress in Lima, Peru [31], the average number of nephrologists in Latin America was 16 pmp (range 4–51), a rate lower than the 20 pmp agreed by SLANH and PAHO as a reasonable objective [18, 31, 32]. Likewise, it is presumed that the number of renal professionals in nursing, nutrition, social service, and psychologists is also insufficient to address the demand for face-to-face care in each of the stages of CKD.

The complex epidemiological context and its impact on people's health urgently require policies to promote kidney health in the population and implement strategies focused on prevention that facilitate early diagnosis, stop or slow progression, reduce cardiovascular morbidity and mortality, and allow timely and informed admission to dialysis/transplantation or non-dialytic conservative treatment in the final stage [14, 16, 18, 22, 34]. Likewise, since diabetes mellitus and arterial hypertension are predisposing diseases, their timely diagnosis and treatment should be incorporated into CKD prevention programs at the primary care level [14, 16, 18, 22, 34].

20.3 Role of Prevention in a Renal Health Strategy

As an objective, prevention considers a wide variety of interventions aimed at reducing risks or threats to health [22–27, 35, 36]. A preventive model in CKD should be based on the three classic categories of prevention: primary, secondary, and tertiary [35, 36] (Fig. 20.1).

In primary prevention, interventions are aimed at avoiding the disease in the population at risk. Education and promotion of healthy lifestyles, as well as adequate and timely screening and control of people with risk factors or those susceptible to developing CKD, such as diabetes mellitus, high blood pressure, obesity, cardiovascular disease, among others. Secondary prevention addresses the therapeutic management of CKD already diagnosed, and its interventions aim at investigating, stopping, or slowing down the progression of the disease and preventing complications.

Finally, in the advanced stages of the disease, tertiary prevention, along with preventing, screening for, and treating associated complications (especially cardiovascular, anemia, and bone/metabolic complications), is aimed at promoting informed and timely admission to any of the four treatment options: hemo/peritoneal dialysis, kidney transplant, or conservative/palliative treatment. These interventions focus on preserving the person's functional capacity and residual renal function and improving their life expectancy and quality of life [35, 36].

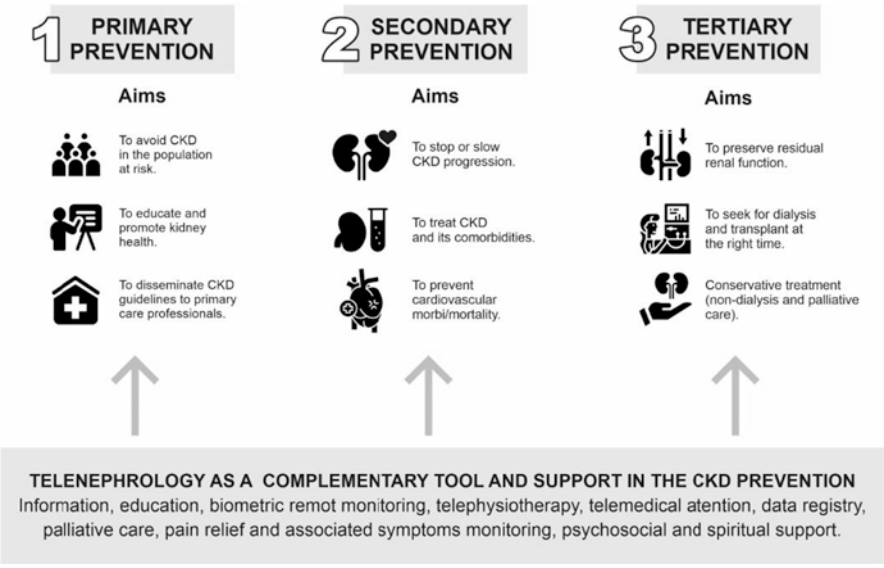

Fig. 20.1 Objectives of CKD prevention. Complementary role of digital nephrology

20.4 Computerization and Prevention of CKD

Considering the need to facilitate decentralized and agile management in a preventive strategy, it has been proposed to develop models that consider the use of ICTs in renal health programs, including the telemedical care modality (synchronous or asynchronous), monitoring and control distance, data recording/analysis, and education of people with CKD [7–13, 18, 37–47].

The scope of application of ICT in healthcare is very changeable due to constant technological advances. In practice, the different concepts used can be confusing, and, in many cases, there are no complete and definitive definitions. In this chapter, the terms telehealth and telenephrology refer to the following definitions:

(a) Telehealth is an umbrella term that covers a wide range of health and care services delivered through information and communication technologies (ICTs). It encompasses a growing variety of applications and services using two-way video, the Internet, email, smart phones, wireless sensors, and other forms of telecommunication technology. These applications support long-distance clinical healthcare, videoconferencing, transmission of still images, remote monitoring of vital signs, patient and professional health-related education, public health, and health administration [39].
(b) Telenephrology (TN) is a term that refers to the application of telehealth in kidney care. TN facilitates direct communication between providers (PCPs and kidney specialists) or between patients and providers to exchange information for care delivery [39].

The use of ICTs in the three categories of prevention described above is a valuable support tool that facilitates continuity of care, articulation, and coordination within and between the different levels of care in a health network, especially when there is difficulty of access to professionals for a face-to-face consultation. Likewise, it facilitates expedited communication with the patient and better control of risk factors, particularly in people with a higher risk of complications, allowing continuous monitoring of health data. Figure 20.1 shows the telematic benefits that support CKD prevention, from kidney health promotion to RRT and palliative care at the end of life.

Computerization in nephrology, along with supporting access and care for patients with CKD, generates a large amount of clinical and socio-demographic data (big data), which, when analyzed by artificial intelligence, will provide valuable information and knowledge for decision-making in health teams with more precision, as well as for the development of clinical guidelines and public health policies [45]. In addition, it will allow optimization of human and material resources, integration of both clinical and administrative processes, information registration, and reduction of health expenses. Figure 20.2 summarizes the benefits and services that digital nephrology would offer people with CKD and their families to strengthen renal prevention interventions.

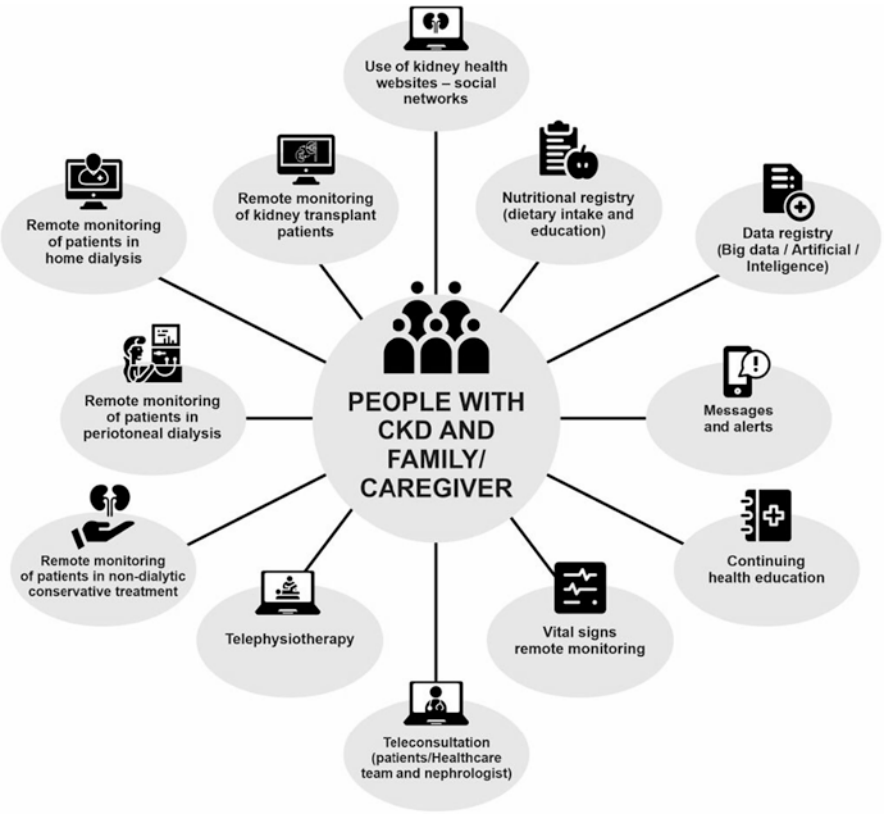

Fig. 20.2 Health assistance and services provided by digital nephrology to CKD patients. Modified from Stauss M et al. [47]

20.5 Telehealth in a Systemic Strategy of Network Renal Health: A Proposal Under Evaluation

As part of a health network, theoretically, patients with CKD move between the different levels of care according to the stage of the disease and clinical requirements. However, these levels of care are usually not integrated or coordinated with each other, which affects the continuity of care and timely care of the patient.

The proposal to incorporate digital technology into a systemic approach strategy for CKD considers the use of ICTs as articulators for the integration and coordination of promotion, prevention, and care work in a health network, from primary care to the most specialized levels (Fig. 20.3). In turn, the use of ICTs allows the collection and sharing of relevant clinical and epidemiological information for health management in the respective geographical area, as well as making diagnostic and therapeutic decisions in a timely, expeditious manner and efficient.

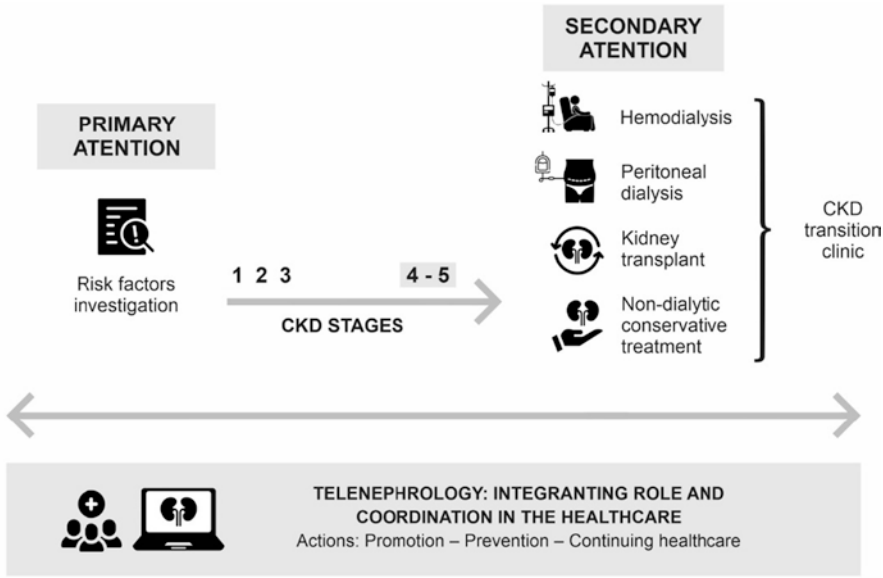

Fig. 20.3 Telenephrology: role in a renal healthcare network

The proposed modality establishes that once the person with CKD has been detected in a health network that requires specialized evaluation, the primary care physician can send relevant clinical and laboratory information through a digital platform designed for asynchronous evaluation to a teleconsultant nephrologist, who responds to the PHC doctor via the same platform. Once the clinical information is analyzed, the nephrologist has two response options (triage): (1) to counter-refer the patient back to the referring establishment to either obtain new information or undergo exams or provide suggestions or recommendations for continued treatment; (2) to refer the patient to a more complex center in the network for a face-to-face evaluation and further specialized studies or treatments [7, 47, 48] (Fig. 20.4).

For the objectives of this proposal, the asynchronous TN model is considered more effective than the synchronous TN model (video conference between the specialist and the PHC doctor) because the asynchronous model does not require both professionals to be available at the same time, uses less technology, and reduces the time per nephrologist consult [7].

This strengthens the continuity of care centered on people from the early stages of the disease until admission to renal replacement therapy (dialysis/transplantation) or non-dialytic conservative treatment, avoiding unnecessary travel and optimizing the scarce resource of specialists [7, 37, 39, 45, 46].

Expedited access to medical specialists via telematics also has a training and continuing education role for primary care professionals, especially in the implementation and application of CKD clinical guidelines, as well as support in management and diagnostic decision-making and/or therapeutic.

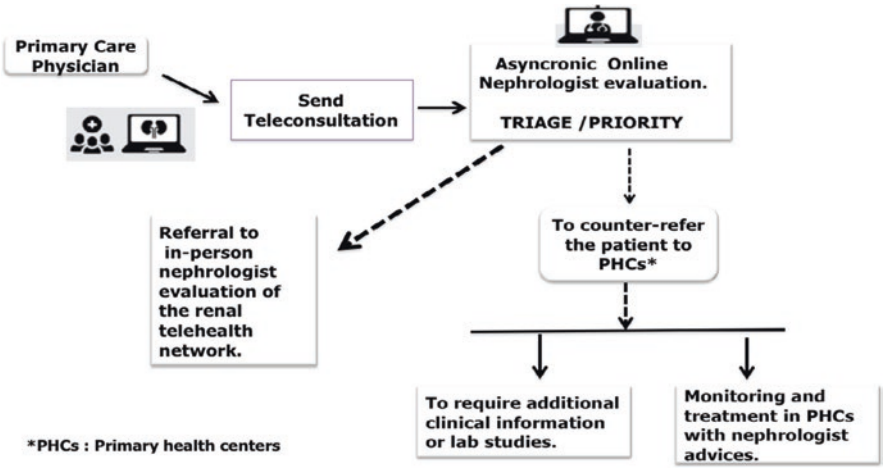

Fig. 20.4 Workflow of asynchronous telematic care by nephrology in a health network. Modified from Zúñiga C, et al. [7]

In practice, teleconsultation results in a triage, which allows selecting and classifying the clinical risk, severity, and complexity of a given health problem [46–48]. For example, it prioritizes whether the care is pertinent, urgent and whether it requires a referral for a face-to-face evaluation or can continue to be monitored electronically. The latter makes it possible to decongest medical centers and emergency services, which have been especially relevant during the current COVID-19 pandemic [11, 49]. However, the telematic modality complements but does not replace the face-to-face clinical evaluation when it is indicated.

Table 20.1 summarizes the advantages that telematic care would have in a kidney health network strategy [46].

In cases of natural disasters (earthquakes, floods) or health emergencies such as the COVID-19 pandemic, telematic care would allow continuity of care, monitoring and control of chronic patients at home, especially for inhabitants of geographically remote or difficult-to-access areas, avoiding unnecessary travel and mitigating the risk of contagion [7, 11, 46].

The disadvantages that telematic care would have in a kidney health network strategy are summarized in Table 20.2. Telenephrology initiatives are being widely accepted by practitioners and patients, but comparison with the conventional system and the impact of provider and patients' experience of care, population health, and costs is still unclear [9, 10, 39]. There are significant barriers to adoption, some common to all aspects of telemedicine and some specific to nephrology. These limitations can be categorized into four categories of issues: (1) reimbursement, (2) clinical, (3) legal, and (4) societal [9, 10, 39].

Table 20.1 Advantages of telenephrological care in a health network

Improves timely access to the nephrologist • Solves the waiting lists • Prioritizes specialized care according to the severity of the patient • Allows more decisive consultations by having exams previously requested
Improves quality of care • Defines clinical risk, gravity, relevance, care modality, triage • Provides prompt and timely care
Stimulates work in the care network • Decongests secondary level medical centers, especially in catastrophes and health emergencies • Frees face-to-face consultations by a nephrologist and optimizes the scarce resource of specialists in nephrology • Strengthens resolution at the first level of care
Strengthens people-centered care • Facilitates access to a nephrologist from remote areas or disaster situations • Equity and democratization of car • Allows continuity of care (monitoring consultations—chronic control) • Attenuates the anxiety of the person waiting to access a consultation • Avoids irrelevant face-to-face consultation
Indicator monitoring • Compiles and records clinical history and advances request for examinations • Allows monitoring management and clinical indicators • Records clinical and epidemiological data (big data), to plan interventions and public policies in renal health continuing education • Promotes continuing education, support in decision-making for clinical management and the empowerment of professionals at the first level of care
Environment and patient costs • Contributes to reducing environmental pollution (carbon footprint) by retail displacement number and face-to-face evaluations • Reduces out-of-pocket expenses for transportation

Table 20.2 Disadvantages of telenephrological care in a health network [10, 40]

1. Lack of long-term outcomes data comparing telenephrology with conventional systems.
2. Limited ability for physical exam.
3. Potential detrimental impact on doctor-–patient relationship. (tele-based vs. in-person).
4. Unproven reliability of smartphone apps.
5. Costs and lack of availability of equipment.
6. Lack of expertise in handling equipment.
7. Issues with reimbursement of providers and facilities.
8. Barriers due to medical legislation.
9. Uncertain malpractice and legal frameworks
10. Challenging for patients with hearing or visual impairments.
11. Costs and time required to acquire and train on equipment

20.5.1 Administrative, Technical, Legal, and Ethical Considerations on the Use of Telehealth in a Renal Health Network Strategy

The implementation of the proposed strategy requires changes in clinical/administrative management and a reorientation of the work of the teams in the health network at each level of care. To achieve this goal, it is essential to have the commitment, motivation, and cooperation of health planners, administrators and managers, service providers, primary care health teams, and participating groups of specialists. It is necessary to educate and raise awareness at the different levels of the network about the health impact, the high burden and cost of CKD, and to provide information on proven, feasible, and cost-effective interventions that can reduce morbidity and mortality and the cost associated with CKD [1–10, 15–19, 22–27, 35, 36, 45]. Likewise, it is necessary to promote the implementation of ICTs as a complementary technological resource to improve clinical/administrative management, data recording, continuity of care and quality of care throughout the health network for the direct benefit of people (Table 20.3) [1–10, 40, 45–47].

The essential technical requirements to develop digital health activities deal with having the necessary devices, information systems, platforms, and easy access to the internet. Likewise, it is required that the professionals who provide telematic care, as well as the patients who receive it, have the knowledge, skills, and adequate digital literacy (Table 20.2) [18–23, 46].

As in any health service, the minimum standards of safety, efficacy, and quality of care must always be protocolized and guaranteed, as well as ensuring the rights of privacy and digital confidentiality [50–52]. It is therefore imperative to have validated platforms and databases that ensure the protection of data, especially those sensitive to people. It is also necessary to have a legal framework that establishes rights, duties, and regulations for patients and those who perform telematic health care [46, 50–54].

The ethical requirements in telematic care are not different from face-to-face care, and they are based on a pact of trust between the patient and his medical team [46, 50–53]. Patients must be able to trust that their treating team will put their well-being above other interests, provide competent care, transparent and complete

Table 20.3 Telehealth implementation requirements in a health network

• Reorientation of clinical/administrative management in the health network
• Commitment, motivation and cooperation of directors and chief executives
• Devices, software, information systems and internet connection quality
• Digital literacy for the use of online networks (health teams and patients)
• Validated platforms that ensure confidentiality and protection of data
• Informed consent—Professional identification—Secure data registration
• Legislation/legal framework and care protocols that guarantee the lex artis and safeguard the principles of medical ethics
• Expedited coordination with service centers for eventual referral and ICT technical contingency protocols

information for decision-making, respect the person's privacy and confidentiality, and take the necessary actions to guarantee the continuity of care [46, 50–54].

Finally, to ensure the continuity of health care, it is mandatory that care services have protocols and referral channels so that the person attended in the telematic modality (especially the first care) can be referred, if required, to a face-to-face assessment as fast as possible. Likewise, it is required to have contingency plans for technical problems of ICTs that could interfere with adequate care.

20.5.2 Report of Telenephrology in a Renal Health Network Strategy. Chilean Experience

The first report in Latin America on the use of telenephrology in a Networked Renal Health Strategy was published by Zúñiga et al. [7]. The strategy was implemented in 2012 in two public health services in the cities of Concepción and Talcahuano in southern Chile.

As reported, in 6 months, it was possible to reduce the waiting time for specialist care from an average of 225 days to 2.5 days for telematic care and 30 days for face-to-face care (Fig. 20.5). Of the 4668 patients evaluated, 57.3% did not require face-to-face evaluation by a nephrologist and were referred to primary care with therapeutic recommendations from the specialist.

The investigation and timely telematic referral of patients with CKD in advanced stages 4–5 made it possible to streamline and prioritize face-to-face care by a nephrologist and educate, without urgent urgency, about treatment options: hemo- or peritoneal dialysis, kidney transplant or treatment non-dialytic conservative. The

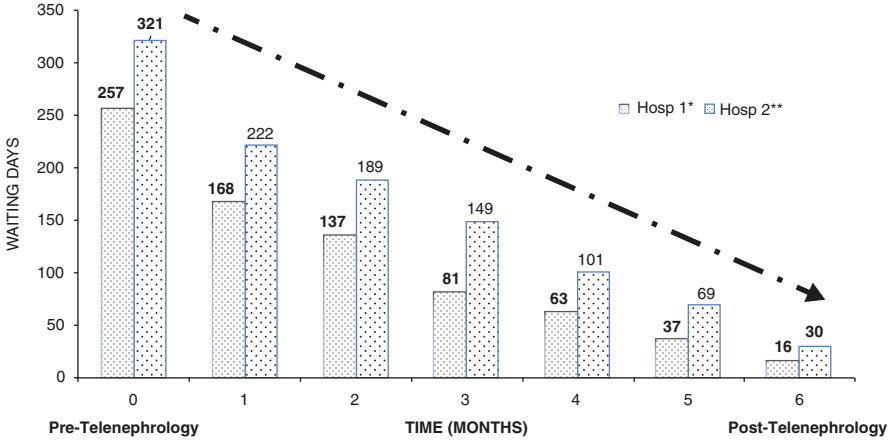

Fig. 20.5 Changes in the wait time for face-to-face evaluations at both the hospitals during the first 6 months of telenephrology (TN). * Hospital 1: Hospital Las Higueras—Talcahuano—Chile. ** Hospital 2: Hospital Regional—Concepción—Chile. (Modified from Zúñiga C, et al. [7])

choice of peritoneal dialysis increased from 5% to 16.3%, admission to hemodialysis with arteriovenous fistula increased from 28.3 to 60.3%, and admission to emergency dialysis without prior evaluation was minimized to 0.9%.

The satisfaction evaluation of the use of telenephrology by primary care physicians was 86.7%, highlighting the continuing education and prompt access to the specialist.

In 2018, the Chilean Ministry of Health implemented the Digital Hospital, a public policy which aimed at promoting the use of telehealth in all specialties of the healthcare network (https://www.hospitaldigital.gob.cl/#). Considering the auspicious results previously reported [7], telenephrology was one of the first specialties to be incorporated into this national telemedical plan. Since its implementation, 15,685 asynchronous teleconsultations have been carried out in nephrology (2019: 50.8%; 2020: 31.9%; 2021: 17.3%). Most of the patients evaluated (61.7%) were referred to continue their treatment at the primary care level with specialist recommendations, thus optimizing the limited availability of face-to-face care aggravated by the shortage of nephrologists in the country. During the COVID-19 pandemic period (2020–2021), the use of telenephrology was restricted, but it allowed the continuity of control of CKD patients and decongested primary care and emergency centers.

Recently, the Chilean Ministry of Health has established the Network Renal Health Strategy as a public policy, based on the previously reported experience, where the use of digital technologies plays a substantial role as an articulator of the administrative and clinical management of the comprehensive approach of CKD [19].

Our first results are promising, but it will be necessary to compare the application of this strategy in other countries with similar epidemiological and socioeconomic realities.

Likewise, in future studies, the impact of this telemedical strategy in the follow-up of patients with CKD, the decrease in CO_2 emissions related to the reduction of displacement, and the level of satisfaction of patients and PHC teams should be evaluated, as well as the effective cost evaluation of this innovative assistance modality.

20.6 Telehealth and Telenephrology in Latin America

The use of telenephrology in Latin America has had a progressive but uneven development between and even within countries. In this regard, the SLANH Renal Health Committee conducted a survey in the second semester of 2021 to find out the level of use of telemedicine in nephrology in the countries that make up the Latin American Society of Nephrology and Hypertension (SLANH), as a preliminary instance to obtain information and design proposals to promote telenephrology [21]. In addition, 15 of the 22 Societies participating in SLANH responded. Only four

countries reported using telenephrology for the care of patients with CKD in the public system and primary care. Two of them with national coverage and two with regional coverage.

In five countries, the use of telenephrology was reported for the control of patients undergoing RRT renal replacement therapy (three in peritoneal dialysis and two in kidney transplant). Only one country reported having educational content on telehealth/telenephrology in its curricular programs for nephrologists in training [21].

Although there are Latin American experiences regarding the use of ICTs in nephrology, published or reported in specialized conferences or congresses, their use is not yet incorporated into public health policies or strategies in all countries. The referred survey evidenced a digital gap that urges the development and implementation of national and regional strategies that promote the use of telehealth/telenephrology. These actions should include access to and use of technology in remote care and monitoring of kidney patients, continuing education and training of patients, care teams, and professionals in training.

Until now, in Latin American countries, the most developed telemedical activity has been continuing education through online courses in synchronous and asynchronous modalities.

20.6.1 Use of Continuing Tele Education in Nephrology and Prevention of CKD in Latin America

In 2013, the SLANH organized a telematic continuing medical education program for Latin American nephrologists and kidney professionals. Logistical, IT, and educational support was provided by Evimed, a Uruguayan educational company specialized in telematic continuing education in the field of medicine. Since then, multiple courses have been held with the participation of professionals from the region who work in different areas of nephrology, some of them residing in remote areas of Latin America [20].

The modality of these distance education courses are telematic, asynchronous and/or synchronous, and bilingual (Spanish and Portuguese). Courses begin with a face-to-face online plenary launch conference, followed by lectures carried out by regional and global experts. Everything is complemented by multiple educational strategies, such as readings of selected articles, educational videos, evaluation of clinical cases (e-rounds), and pre and post course evaluations. It ends with a closing conference and evaluation of the course by the participants [20].

Along with contributing to the education of health teams, the program facilitates the access of health professionals from different Latin American countries who, for reasons of geographical distance, labor restrictions or economic resources, cannot regularly participate in courses, conferences, or face-to-face congresses of the specialty.

20.6.2 PAHO and SLANH Alliance for Telematic Continuing Education in Prevention and Management of Kidney Diseases

In June 2015, the Pan American Health Organization (PAHO) recognized SLANH as a non-governmental organization that supports institutional work priorities [55].

This strategic alliance between both regional organizations aims to contribute to the education of health teams and reduce the gap that separates patients with kidney diseases from access to specialized, timely, and quality care.

20.6.2.1 SLANH Telematic Course on Prevention and Management of Acute Kidney Injury (AKI)

In accordance with the Oby25 ISN initiative for the education and prevention of acute kidney injury (AKI) [56], the SLANH AKI committee implemented in 2015 two free courses, asynchronous online modality, one course for nephrologists and the other for primary care physicians. The Pan American Health Organization (PAHO)/World Health Organization (WHO) collaborated in disseminating the course among Latin American primary care physicians. The evaluation of the organizers reported that the telematic education modality was effective for learning about the prevention and management of AKI [57].

20.6.2.2 Telematic Modality Course of Prevention and Management of CKD for the First Level of Care in Latin America: PAHO/SLANH

In the context of the health challenge that chronic kidney disease (CKD) represents in Latin America, the education of health teams in primary care acquires greater relevance, considering that they are the first level of investigation, diagnosis, and treatment of the disease [14, 18, 22–27]. Under this premise, in July 2016, the Pan American Health Organization (PAHO) in conjunction with SLANH, organized the First Online Course on Prevention and Management of CKD for the First Level of Care in Latin America [58].

The course is free, with unlimited seats, and is especially aimed at Latin American primary care health teams, who are in charge of screening and treating patients with CKD in its early stages. Its modality is telematic, asynchronous, and self-learning, programmed to be completed by the students in approximately 50 h of dedication. Each learning module ends with an evaluation test, which only once passed allows you to move on to the following modules. The presentations are given by leading SLANH nephrologists, and the main topics addressed are: the epidemiology and

Table 20.4 Analysis of the survey of participants in the course for the first level of health care: first level of health care—PAHO/SLANH

	%
Considered the topics relevant to their professional work	98
Evaluated the educational resources favorably	96
Did not need to consult with teaching coordinators	93
Used a mobile device with internet access	86
Accessed the course from home	71
Referred as the greatest advantage the autonomy and freedom of timetable	65
Considered the time required for the course to be the greatest difficulty	47
Reported internet access problems	17

prevention of CKD, diagnosis and treatment in its five stages, strategies to prevent progression, diabetic and Mesoamerican nephropathy, management of comorbidities, and timely referral to the nephrologist [55].

From the beginning of the course until July 2021, 34,918 professionals have registered. The course satisfaction survey revealed a positive general evaluation by the course participants, highlighting free of charge, self-administration, attention by the tutor, practical applicability, and discussion of clinical cases (see Table 20.4) [59].

Among the pending tasks of the course one may mention evaluating the impact on the long-term results of the course, both in the knowledge acquired and its application in daily practice, and updating the contents and use a more modern, friendly, and easily accessible platform.

20.6.3 Initiatives Under Development at SLANH to Promote Telehealth in Nephrology Practice

20.6.3.1 Contents of Digital Nephrology in the Training of Nephrologists in Latin America

In 2015, the SLANH published some recommendations for the training of nephrologists in Latin America [60]. In its proposal, the "use of telemedicine to provide care services or health education, and/or develop continuous medical training activities" is promoted, considering the significant contribution of telehealth/telenephrology and its potential growth in the near future.

By this recommendation, it is intended that education on the use of ICTs in nephrology, its indications, advantages, limitations, and ethical and legal considerations are included in the contents of training programs. However, the aforementioned survey on the use of digital nephrology in the region, revealed that unfortunately this proposal has not yet been implemented in most of the Societies belonging to SLANH and is one of the challenges considered in the new institutional strategic plan [18, 21].

20.6.3.2 Digital Platform for the Management of CKD in Primary Care

The SLANH, through its Renal Health Committee, has proposed to promote the use of digital technology to address CKD in the Region [18]. In addition to continuing with telematic education on CKD for primary care teams, it plans to develop a digital platform that will facilitate quick and timely access of CKD patients to the nephrologist, referred by the primary care teams dependent on the public health systems. The SLANH would make this platform available to Latin American countries that require it, to carry out asynchronous teleconsultations carried out by nephrologists who participate in this initiative. In those regions of Latin America where there was a lack of specialists, SLANH would coordinate with the respective health authority and the local Society of Nephrology and would request support from national nephrologists or from other countries in the region, so that they could voluntarily respond to teleconsultations. This initiative is part of the social commitment and community involvement that inspires and sustains SLANH.

To achieve the proposed objectives, it is expected to establish a strategic alliance with PAHO and thus promote and coordinate the use of the platform in those Latin American countries that require it, adapting to health standards and technical, administrative, legal, and public policy conditions of each country.

20.7 Telenephrology in Latin America During the COVID-19 Pandemic

During the COVID-19 pandemic, the use of telemedicine has intensified in different parts of the world [11, 49, 61]. In the context of the health emergency, the SLANH and its affiliated Societies used social networks and ICTs (especially Twitter, Facebook, Instagram, and Webinars) to collect and record data from patients infected with RRT, deliver recommendations for prevention of contagion, educational content for confinement, instructions on vaccines, and management of acute kidney injury associated with COVID-19.

In Brazil, during the pandemic, various telemedicine services, including telenephrology (mostly concentrated in the private sector), have been providing assistance to the Brazilian population [40].

In Chile, the “Fundación Educacion Renal” and “Fundación Pro Salud Renal,” belonging to the Chilean Society of Nephrology, implemented a web platform for the containment, orientation, and education of patients with CKD who during the pandemic could not access their outpatient check-ups with their renal team (http://educacionrenal.cl/).

Through this platform, people made consultations to specialists through messaging or videoconferencing consultations, participated in forums open to the public and educational talks on different topics. Online support workshops were held

for patients and their relatives with CKD by a multidisciplinary team, who voluntarily supported the continuity of online care for patients with CKD during the pandemic.

20.7.1 Telenephrology in Patients with Advanced CKD Who Were Not on Dialysis During the COVID-19 Pandemic: Preliminary Report

In a report from the Renal Transition Clinic of "Las Higueras" Hospital in Talcahuano, Chile, which cares for patients with advanced CKD in stages 4 and 5 not on dialysis, the televideo consultation modality allowed avoiding unnecessary transfers, favoring confinement with nephrological control remotely and have a greater number of places for face-to-face hospital care at the most critical moments of the COVID-19 pandemic. In the group treated by telenephrology, the incidence of COVID-19 infection was similar to the general population and much lower than the population on hemodialysis. Contrary to expectations, the group controlled by telenephrology had lower lethality and admission to dialysis than the pre-pandemic year.

Regarding the level of satisfaction with the telematic modality, 88% of the patients reported being very satisfied with the care and 77.3% approved of this modality to continue their medical check-ups.

Considering the described results and the good acceptance by patients, the mixed use of telenephrology alternated with face-to-face evaluations post-pandemic should be evaluated as a new option for the outpatient control of people with advanced CKD, especially in older people or people with difficult geographical access [62].

In summary, the computerization of nephrology plays an important articulating and supporting role in a Renal Health Network strategy. It facilitates expeditious access, evaluation, and timely treatment of patients with CKD from the urban/rural primary care level and prioritize face-to-face care by a nephrologist for those with higher risk or severity. Likewise, telematic education for first-level health teams and local nephrology teams would strengthen CKD promotion, prevention, and care actions in a care network. It is relevant to point out that based on what was confirmed during the COVID-19 pandemic, telemedical care would allow continuity of care, follow-up, and control of patients with chronic CKD, especially in geographically remote areas and in situations of natural disasters or health emergencies. The results of the survey on the use of telenephrology in the region revealed a digital divide that calls for the development and implementation of national and regional strategies that promote the use of telehealth/telenephrology.

Finally, the clinical and epidemiological data collected can be later analyzed by artificial intelligence and will provide evidence for the development of public policies and territorial preventive plans coordinated between the different levels of a Health Network.

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