









# Indicators Sensitive to Rehabilitation Nursing Care: A Functional and Technological Respiratory Rehabilitation Program for Elderly People

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**Abstract.** Chronic Obstructive Pulmonary Disease (COPD) is characterized by a series of persistent respiratory symptoms that limit airflow, causing morbidity and even mortality. The intervention of the Rehabilitation Nursing Specialist (RNS) is important to promote actions which ensure functional empowerment in self-care, preventing complications. **Objective:** Identify indicators sensitive to Rehabilitation Nursing (RN) care that promote health gains during intervention at the self-care level within technological respiratory rehabilitation (TRR) programs. **Methodology:** A systematic literature review (SLR) was carried out through research on the EBSCO-HOST scientific platform, the CINAHL Complete and MEDLINE Complete databases, using the Boolean operators “OR” and “AND” and using the PI[C]O method. **Results:** The results of RN are sensitive to the application of TRR plans regarding the self-care of the person with COPD, which demonstrate the importance of intervention and care of Rehabilitation Nursing. **Conclusions:** The results of RN are sensitive to the application of TRR plans regarding the self-care of the person with COPD, which demonstrate the importance of intervention and care of Rehabilitation Nursing.

**Keywords:** Rehabilitation Nursing · Self-care · Person · Program

## 1 Introduction

In the decades between 1980 and 1990, the first programs of RR as a non-pharmacological treatment [1] began, becoming an important recommendation for the treatment of COPD [2] being this a multidisciplinary approach with the aim of optimizing physical functioning, social and autonomy [3]. Currently recommended to all people with COPD according to the categories defined by GOLD [4], it is seen as a method to recover the physical, intellectual, emotional, social and professional capacity of the person [5]. This is a progressive and incurable lung disease [6], characterized by increased shortness of breath due to airflow obstruction [7], caused mainly by tobacco [8].

The development of these programs is the responsibility of RNS, through which it promotes teaching, demonstration and training of techniques, promoting self-care and continuity of care in different contexts [9], identifying specific needs at the level of functionality [10] and the factors that facilitate or make it impossible to carry out ADL independently. Still able to make decisions [11], based on the realization, monitoring and evaluation of differentiated RN plans, based on the recognition of problems [12].

They address exercise plans aimed at education, psychological support, food counseling, and evaluation [7], with education being an important component for TRR, focused on improving knowledge of COPD and teachings related to smoking cessation, exercise, inhalation therapy techniques, and coping strategies [13], with the objective of empowering, informing, and supporting self-care [14] in the person. This makes the optimization of emotional capacity possible through the dominion over the disease, with moderately large and clinically significant improvements [7].

It acts on alveolar ventilation, ventilation-perfusion ratio and diffusion [15], decreasing dyspnea, increasing capacity for physical activity with improvement in quality of life [16].

The results of the programs also depend on the type, duration and effectiveness [17], which must be monitored and evaluated [9].

In this sense, it is important to have indicators that demonstrate the effectiveness of specialized health care with a structure aimed at improving the quality of care provided, as well as professional exercise [18]. It is through care sensitive indicators that RNS evaluates health gains for training, independence and quality of life [9].

EBS being recognized as the key to improving the quality of care, thus ensuring the best results [19], which reflect the impact on the change to best practices, enabling the quality of care and results in the elderly, to whom we provide care [20].

## 2 Methodology

The RSL is a summary of evidence on a specific topic, which through a rigorous process identifies, evaluates and analyzes the various studies in order to answer a specific question [19], proving the need for the study and providing an explanation on issues related to the starting question [21]. It also consists of the analysis of articles with the purpose of obtaining information related to the starting question, determining methods, evaluating relationships between concepts, results and conclusions [22].

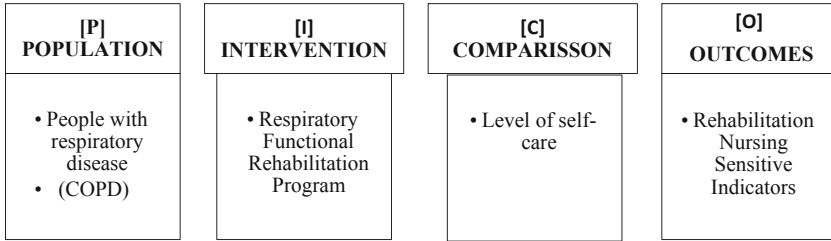
We intend to identify indicators sensitive to RN care [23] that promote health gains [13, 24], during the intervention at the level of self-care, within TRR programs, using systematic and explicit processes, with the objective of reducing the different types of bias, providing reliable results that support the conclusions and decisions [20].

After defining the issue to be addressed, the formulation of the problem emerged through a starting point, based on the PICO structure developed to answer health-related questions [25]. Based on this concept, the starting question arises “What are the sensitive indicators in RN obtained through an TRR program, at the level of self-care in people with respiratory disease (COPD)?”, schematized in Fig. 1.

Following the criteria of FINER (Feasibility, Interesting, Novel, Ethical, Relevant) [26], which demarcate the quality of the research question as viable, interesting, original,

fulfilling the ethical principles and relevant to the practice, we conducted a research through the scientific search platform EBSCOhost, accessing the databases CINAHL Complete and MEDLINE Complete, carried out in September 2019.

The survey consisted of using the following descriptors according to the starting question: (pulmonary disease) (elderly); (chronic obstructive); (dyspnea); (pulmonary emphysema); (health self-care); (patient education); (rehabilitation); (rehabilitation nursing); (Nursing); (Nursing care) and (Nursing intervention) combined with the Boolean operators “OR” and “AND”.



**Fig. 1.** Methodology PICO

The selection of studies was defined according to inclusion and exclusion criteria. Inclusion criteria include articles with TRR plans and self-care interventions in adult participants with COPD. The exclusion criteria were full text, publication date (2009–2019), written in English, and repeated in the databases.

After selecting the studies according to the inclusion/exclusion criteria, 93 articles were obtained, reading the title, abstract, methodology, results and conclusion, during the analysis and detailed reading those that did not answer the starting question were excluded, finding a duplicate. At the end of this selection, we obtained a result of eight articles for this SLR.

Moving on to the next phase, which consists in the evaluation of the quality of the studies, which must be adequate to the inclusion criteria [20], taking into account the rules of authorship, with the due citations and references of the authors, considering the principles of intellectual honesty as an ethical question [27].

### 3 Results

The results become more credible when the selected studies pass through inclusion and quality criteria [19], instituting validity and reliability [20]. In this sense, the classification of the eight articles in terms of quality and scientific evidence followed the system of classification of hierarchy of evidence [19], directed to questions about interventions and treatments. This consists of four levels of evidence: Level I (systematic review or meta-analysis of all relevant randomized controlled trials); Level II (well-designed controlled randomized controlled trials); Level V (systematic reviews of descriptive and qualitative studies); Level VI (single descriptive or qualitative studies) [19] in order to ensure eligibility, quality of results and conclusions, producing current knowledge for the subject under study (see Table 1).

**Table 1.** Characteristics and overview of selected articles.

Article	Metadata	Objectives	Results/Conclusions
1	<p><b>Title:</b> “Effects of modified pulmonary rehabilitation on patients with moderate to severe chronic obstructive pulmonary disease: A randomized controlled trail”</p> <p><b>Authors:</b> Xu et al.</p> <p><b>Year:</b> 2017</p> <p><b>Methodology:</b> Randomized Controlled Study</p> <p><b>Participants:</b> People with COPD</p> <p><b>Level of evidence:</b> II</p>	<p>To evaluate the effects of an adapted RR intervention plan on people with moderate to severe COPD (n = 125) for 12 weeks</p>	<ul style="list-style-type: none"> <li>– The experimental group (n = 63) showed significant improvement, after a 6-min walk test, the control group (n = 62) showed no improvement;</li> <li>– Pulmonary function without significant changes in both groups;</li> <li>– Intervention plan, decreased dyspnea symptoms, increased exercise capacity and improved quality of life</li> </ul>
2	<p><b>Title:</b> “The effect of home-based pulmonary rehabilitation on self - efficacy in chronic obstructive pulmonary disease patients”</p> <p><b>Authors:</b> Khoshkesht et al.</p> <p><b>Year:</b> 2015</p> <p><b>Methodology:</b> Randomized Controlled Study</p> <p><b>Participants:</b> People with COPD</p> <p><b>Level of evidence:</b> II</p>	<p>To investigate the effect of RR on the self-efficacy of people with mild to moderate COPD (n = 66), through weekly visits and telephone monitoring</p>	<p>Intervention group with high performance in self-efficacy relative to the control group (n = 32);</p> <ul style="list-style-type: none"> <li>– Improved self-efficacy in the intervention group;</li> <li>– Demonstrated the importance of self-efficacy in intervention planning, with a view to improving self-care;</li> <li>– Effective program in improving self-efficacy;</li> <li>– Nurses play an important role in education, implementation, encouragement and follow-up</li> </ul>
3	<p><b>Title:</b> “Pulmonary rehabilitation for chronic obstructive pulmonary disease (Review)”</p> <p><b>Authors:</b> McCarthy et al.</p> <p><b>Year:</b> 2015</p> <p><b>Methodology:</b> Systematic review and meta-analysis of randomized clinical trials</p> <p><b>Participants:</b> People with COPD</p> <p><b>Level of evidence:</b> I</p>	<p>Compare the effects of RR versus general care on quality of life, health, functionality and exercise capacity</p>	<ul style="list-style-type: none"> <li>– RR promotes relief of dyspnea and fatigue;</li> <li>– Improvement of the emotional function and feeling of control over the disease;</li> <li>– Improvement in the results of the 6-min walk test with great clinical significance in view of the effects of the program;</li> <li>– Improvement of quality of life, functional capacity and exercise</li> </ul>

*(continued)*

**Table 1.** (continued)

Article	Metadata	Objectives	Results/Conclusions
4	<p><b>Title:</b> “Home or community-based pulmonary rehabilitation for individuals with chronic obstructive pulmonary disease: a systematic review and meta-analysis”</p> <p><b>Authors:</b> Neves et al.</p> <p><b>Year:</b> 2016</p> <p><b>Methodology:</b> Systematic review and meta-analysis of randomized clinical trials</p> <p><b>Participants:</b> People with COPD from the GOLD 2 stage onwards</p> <p><b>Level of evidence:</b> I</p>	<p>Investigate the effects of RR in the home or in the community in comparison with outpatient regime. (intervention defined over a period of 4 weeks)</p>	<ul style="list-style-type: none"> <li>– Improvement of functional capacity and quality of life;</li> <li>– Decrease of the sensation of dyspnea;</li> <li>– High potential in community programs with the use of fewer devices and resources with similar gains in functional capacity compared to other programs;</li> <li>– Improvement of physical capacity</li> </ul>
5	<p><b>Title:</b> “Meta-analysis of the Effect of a Pulmonary Rehabilitation Program on Respiratory Muscle Strength in Patients with Chronic Obstructive Pulmonary Disease”</p> <p><b>Authors:</b> Lee and Kim</p> <p><b>Year:</b> 2019</p> <p><b>Methodology:</b> Systematic review and meta-analysis of randomized clinical trials</p> <p><b>Participants:</b> People with COPD</p> <p><b>Level of evidence:</b> I</p>	<p>Analyze effect of RR programs on respiratory muscle strength</p>	<ul style="list-style-type: none"> <li>– Significant improvement in inspiratory performance and expiratory muscle strength, without significant improvement in pulmonary function;</li> <li>– Increase in maximum expiratory pressure;</li> <li>– Strengthening of expiratory and inspiratory muscles with equal effectiveness through respiratory muscle training for symptom relief;</li> <li>– Increased inspiratory muscle strength associated with improved exercise capacity, dyspnea and quality of life;</li> <li>– Need to adapt the program individually, easily accessible to be performed by people autonomously</li> </ul>

(continued)

**Table 1.** (continued)

Article	Metadata	Objectives	Results/Conclusions
6	<p><b>Title:</b> “Clinical-effectiveness of self-management interventions in chronic obstructive pulmonary disease: An overview of reviews”</p> <p><b>Authors:</b> Murphy et al.</p> <p><b>Year:</b> 2017</p> <p><b>Methodology:</b> Systematic review</p> <p><b>Participants:</b> People with COPD</p> <p><b>Level of evidence:</b> V</p>	Analyze the clinical effectiveness of interventions in COPD self-management, capacity building for disease control and symptoms (studies with education interventions, goals with targets, decision making)	<ul style="list-style-type: none"> <li>– Focus education on improving knowledge about the disease, directed at smoking cessation, exercise, inhalation techniques and “co-ping” strategies;</li> <li>– Education decreases internal-mentals and gives significant gains to health;</li> <li>– Effectiveness of RR programs in quality of life and health with improvement in exercise capacity;</li> <li>– Telephone “Follow up” of the decrease in demand for health services</li> </ul>
7	<p><b>Title:</b> “Effectiveness of a perioperative pulmonary rehabilitation program following coronary artery bypass graft surgery in patients with and without COPD”</p> <p><b>Authors:</b> Chen et al.</p> <p><b>Year:</b> 2018</p> <p><b>Methodology:</b> Qualitative Study (retrospective)</p> <p><b>Participants:</b> Carriers and non-carriers of COPD after coronary artery bypass grafting</p> <p><b>Level of evidence:</b> VI</p>	Compare efficacy of RR in people undergoing coronary artery bypass grafting (n = 78), with (n = 40) and without (n = 38) COPD pathology	<ul style="list-style-type: none"> <li>– Interventions: smoking cessation; breathing exercises (3 times a day); muscle exercises (30 min a day); incentive spirometry (3 times a day); accessory maneuvers and postural drainage (1 week in the preoperative period and 2 weeks in the post-operative period);</li> <li>– Improvement of maximum inspiratory and expiratory pressures, and respiratory rate found in both groups;</li> <li>– Improvement of respiratory function between the 1st and 14th postoperative days in both groups;</li> <li>– Improvement of pulmonary and muscular function in both groups;</li> <li>– RR program reduces pulmonary complications and mortality in people with COPD</li> </ul>

(continued)

**Table 1.** (continued)

Article	Metadata	Objectives	Results/Conclusions
8	<p><b>Title:</b> “Facilitating education in pulmonary rehabilitation using the Living Well with COPD programme for pulmonary rehabilitation: a process evaluation”</p> <p><b>Authors:</b> Cosgrove et al.</p> <p><b>Year:</b> 2013</p> <p><b>Methodology:</b> Qualitative study</p> <p><b>Participants:</b> People with primary diagnosis of COPD (n = 57) and professionals (n = 25)</p> <p><b>Level of evidence:</b> VI</p>	<ul style="list-style-type: none"> <li>– Adapting the self-management program, (Living Well with COPD) in rehabilitation care</li> <li>– Effectively evaluate the process of an adapted program</li> <li>RFR intervention lasting 15 months in 11 hospitals, consisting of 6 weekly sessions of 30 to 45 min</li> </ul>	<ul style="list-style-type: none"> <li>– Self-management program with good acceptance by people (62.3% participated in the sessions) and professionals, demonstrating effectiveness in the RR plan, both in hospital and community settings;</li> <li>– Acquisition of knowledge and improvement in the perception of the disease;</li> <li>– Sessions classified as good or excellent by people and health professionals;</li> <li>– This type of program can be used in educational sessions with quality, consistent, equitable in RR both in the hospital and in the community</li> </ul>

## 4 Discussion

Obtaining and monitoring health gains, and producing sensitive indicators, are priorities for continuous quality improvement in health [12]. To obtain results that integrate the indicators, it is important to adapt the intervention plans to the individual, allowing their capacity building for self-care [28], these being described in Table 2.

**Table 2.** Rehabilitation nursing care sensitive indicators identified.

Indicators of results	Sensitive Indicators
Functional state	<ul style="list-style-type: none"> <li>– Increase in exercise tolerance and capacity [7, 8, 13, 16, 17];</li> <li>– Improvement of functional capacity [8];</li> <li>– Improvement of physical fitness [8]</li> </ul>
Respiratory indicators	<ul style="list-style-type: none"> <li>– Improvement of the inspiratory capacity [17];</li> <li>– Increase in expiratory muscle capacity [1, 17];</li> <li>– Improvement of maximum expiratory pressure [1–17];</li> <li>– Improvement of inspiratory muscle strength through physical exercise [1, 17];</li> <li>– Decrease of pulmonary hyperinflation [17];</li> <li>– Improvement of respiratory rate [1];</li> <li>– Improvement of pulmonary function [1, 29]</li> </ul>

(continued)

**Table 2.** (continued)

Indicators of results	Sensitive Indicators
Training for self-care	<ul style="list-style-type: none"> <li>– Improvement in self-efficacy through RR programs [28];</li> <li>– Training for self-care [28];</li> <li>– Improvement in autonomy [17];</li> <li>– Improved access to programs [17];</li> <li>– Better perception of people in relation to autonomy [29]</li> </ul>
Professional/personal relationship	<ul style="list-style-type: none"> <li>– Improvement in implementation, incentive and follow-up [28];</li> <li>– Improvement in meeting needs [17]</li> </ul>
Symptom control	<ul style="list-style-type: none"> <li>– Relief from dyspnea [7, 8, 16, 17];</li> <li>– Decrease of tiredness [7];</li> <li>– Improvement of people's perception of the disease [7];</li> <li>– Increase in respiratory function programs with effectiveness [17]</li> </ul>
Person's satisfaction	<ul style="list-style-type: none"> <li>– Improvement of emotional balance [7];</li> <li>– Confers gains in health [13];</li> <li>– Decrease of pulmonary complications [1];</li> <li>– High satisfaction of people regarding the program [29];</li> <li>– High participation in the programs [29]</li> </ul>
Use of health services	<ul style="list-style-type: none"> <li>– Decreased need to use Non Invasive Ventilation [NIV] and OLD [8];</li> <li>– Improvement of health status [13];</li> <li>– Decrease in the need to use health services [13];</li> <li>– Increased efficiency of RR plans [29]</li> </ul>
Training for knowledge	<ul style="list-style-type: none"> <li>– Improving health education [13, 28];</li> <li>– Improvement of knowledge about the disease [13, 29];</li> <li>– Additional educational sessions [29]</li> </ul>
Therapeutic adherence	<ul style="list-style-type: none"> <li>– Increase in smoking cessation [13];</li> <li>– Improvement of inhalation techniques [13];</li> <li>– Increase in coping strategies [13];</li> <li>– Improvement of knowledge about therapy [29];</li> <li>– Implementation of strategies in the transition between education and exercise sessions [29]</li> </ul>
Training for quality of life	<ul style="list-style-type: none"> <li>– Improvement of quality of life [7, 8, 13, 16, 17]</li> </ul>
Mortality	<ul style="list-style-type: none"> <li>– Reduction of mortality [1]</li> </ul>

Table 2 shows that the improvement in functional capacity [8] resulting from TRR intervention plans is corroborated by several authors, verified through the increase in capacity for the exercise [7, 16, 17].

In the study [17], aerobic exercise is identified as an important component for RFR intervention plans, due to the strengthening of expiratory and inspiratory muscles, promoting significant improvement in inspiratory performance and expiratory muscle



strength, reflecting in the increase of maximum expiratory pressure and reducing pulmonary hyperinflation. Also another study analyzed, proves improvements in maximum inspiratory and expiratory pressure and respiratory rate, reflected in a general way, in the increase of respiratory muscle strength with improvement of pulmonary function, documented in the 2 groups of the study [1].

Regarding the functional evaluation, in which the measuring instrument was used, a 6-min gait test, significant improvement was observed in the experimental group [16], in another study with the same instrument a result of 43.93 m of walking tolerance [7] was demonstrated. It is also noted significant improvement of dyspnea [17] through the Borg Scale and mMRC questionnaire, at the end of 12 weeks of intervention [16], people have exercise tolerance.

Dyspnea is one of the symptoms of COPD that can be controlled through respiratory muscle training and physical exercise [30] and can be equally effective in relieving these symptoms [17], incorporated in an TRR intervention plan. The decrease of dyspnea as a relief condition [7, 8, 16, 17], as well as of fatigue, promotes a feeling of control in the person over the disease [7]. A study reveals that a program for the management of the disease has good acceptance by the participants, revealing a participation of 62.3% in the sessions, which were classified from good to excellent, demonstrating the self-efficacy of the program [29].

The effectiveness of the RFR, depends on the intervention program, which should be selected according to the needs of the person [17], aiming at its functionality and autonomy. Its implementation also includes encouragement and monitoring [28], based on a relationship of trust [31]. One of the studies concluded that an RFR program is effective in improving autonomy [28], and self-care, promoting the accessibility of the program to people to be carried out autonomously [17].

It also benefits the functional aspects of physical capacity [8], causing a reduction in pulmonary complications [1], and consequently reducing hospitalizations [13]. These aspects have influence on the improvement of the emotional function capacity [7], to meet the satisfaction of the person, because the anxiety associated with COPD [30], causes social isolation, motivated by disabilities caused by the disease itself.

The TRR Plan is efficient in both hospital and community settings [29], but community programs have high potential because they use fewer devices and resources [8], conferring significant health gains [13].

Telephone follow up is one of the strategies that gives results, reducing the need to resort to health services and home visits [13].

Education is considered an important component [13] in the intervention, in which RNS has an effective role in teaching [28]. However, education should be focused on improving the perception of the disease [13], to acquire knowledge [29] that alters life habits, effective administration of inhalation therapy and to train people for ADL. Therefore, educational sessions with quality, consistent and equitable, are important both in hospital and community settings [29].

Thus, by improving a person's perception of the aspects of the disease [29], it is possible to encourage therapeutic adherence, smoking cessation, improved exercise and coping strategies [13], and the quality of life improves significantly after completing

the program [8], an aspect confirmed through several studies [7, 8, 16, 17], leading to decreased mortality [1].

## 5 Conclusion

Nursing is a science that covers a universe of knowledge, rehabilitation is a branch of its specialty that incorporates an identity organized in methodologies, aiming at training the person for autonomy [17, 29]. For RNS to develop its competencies and increase its knowledge, it needs to develop projects in the practice of its care, based on scientific evidence to obtain results sensitive to nursing care [9, 13, 28, 29] in elderly people.

The results found in this study allow us to verify sensitive indicators of RN [23] for the application of TRR plans, referring to the self-care of the person with COPD [17, 28, 29] which demonstrate the importance of RN intervention and care. This study reinforces the importance of developing adapted programs, these with good acceptance [29], noting the improvement in functionality [7, 8, 13, 16, 17] in terms of physical exercise and mobility [8] and respiratory capacity [17], as well as in the control of symptoms aimed at empowerment of autonomy and self-care [17, 28].

Another aspect, important to emphasize in the results of the analysis of this SLR is the improvement of people's quality of life [7, 8, 13, 16, 17] in which it shows that although the disease presents itself in acute or chronic form it is possible to maintain stability and relief of symptoms, countering complications [7, 8, 16, 17].

Thus, it is possible to design and implement ER intervention programs, based on these sensitive indicators, suggesting, however, the continuity of scientific studies in this area with a view to the continuous improvement of nursing care.

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