



ISSN: 2230-9926

Available online at <http://www.journalijdr.com>

IJDR

International Journal of Development Research
Vol. 10, Issue, 02, pp. 33966-33972, February, 2020



RESEARCH ARTICLE

OPEN ACCESS

NURSING CARE TECHNOLOGIES FOR ELDERLY PEOPLE WITH CHRONIC NON-COMMUNICABLE DISEASES

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ARTICLE INFO

Article History:

Received 19th November, 2019
Received in revised form
27th December, 2019
Accepted 21st January, 2020
Published online 27th February, 2020

Key Words:

Technologies; Elderly; Nursing care;
Chronic disease; Nursing.

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ABSTRACT

Objective: To identify nursing care technologies for the elderly with chronic non-communicable diseases. **Methods:** integrative literature review consisting of six steps. Data collection took place in May 2019, in the PUBMED, LILACS and BDENF databases, with the descriptors "Technology", "Chronic Disease", "Nursing Care" and "Elderly", delimited by the Boolean operator "AND". For the international databases, the corresponding descriptors in Medical Subject Headings were used. Eleven original manuscripts were included in Portuguese, English and Spanish, available in full and published between 2008 and 2018. The data were analyzed in a descriptive way, organized in summary tables and in analytical categories: light and light-hard technologies for the nursing care for the elderly with chronic diseases and harsh technologies for nursing care for the elderly with chronic diseases. **Results:** Of the manuscripts, 10 (90.90%) were found in the PUBMED database and 01 (9.09%) in LILACS. 10 (90.90%) of them were published in English. As for the level of evidence, six (54.54%) studies had level VI. Five (45.45%) surveys referred to light-hard technology, five (45.45%) to hard technology and one (9.09%) to light technology. **Conclusion:** the results of this study are useful for identifying technologies for nursing care for the elderly with chronic non-communicable diseases, being a source for expanding the knowledge of nurses in care practice that serve this specific audience.

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Citation: Francisca Valúzia Guedes Guerra, Ticiane Freire Gomes, Glauciano de Oliveira Ferreira et al. 2020. "Nursing care technologies for elderly people with chronic non-communicable diseases", *International Journal of Development Research*, 10, (02), 33966-33972.

INTRODUCTION

Aging is defined as an irreversible and inexorable process for everyone, being characterized by morphological, physiological, biochemical and psychological changes that lead to a decrease in the individual's ability to adapt to the environment and, consequently, death (Araújo et al., 2017). In recent years, the number of elderly people increased and the great challenges, raising life expectancy is not enough, making it necessary to add quality of life to additional years (Toldrá et al., 2017). In view of this, it is understood that, due to the specificities of aging, elderly people have diverse demands for services and care.

One of the main concerns has been the emergence of chronic non-communicable diseases (CNCD) that become more prevalent in this stage of life (Brasil, 2013). In this sense, it is important to highlight that CNCD constitute a set of chronic conditions, related to multiple causes, with gradual onset, with a usually uncertain prognosis, with long or indefinite duration. These disease categories have a clinical course that changes over time, with possible periods of exacerbation, which can lead to disabilities (Brasil, 2013). There are at least four main types of CNCD. They are: cardiovascular diseases, cancers, chronic respiratory diseases and diabetes. Such diseases were the cause of 63% of deaths in the world and 72.6% of deaths in

Brazil, in 2013, which causes interferes with the quality of life of the affected population (Melo, 2018; Mendes *et al.*, 2018). When they affect elderly people, CNCD make them more fragile and weakened to exercise their independence and autonomy. This makes it necessary, in addition to specialized care, long-term care and comprehensive care services that meet all needs in a multiprofessional way (Mendes *et al.*, 2018). In view of this, the performance of health professionals, especially nurses, especially with regard to prevention, treatment and monitoring of the elderly, is essential, in order to reduce morbidity and mortality due to CNCD (Abreu *et al.*, 2017). Thus, the care of life and health in the aging process for nursing must continue to invest in the promotion of healthy aging, seeking to extend the state of health and well-being of the elderly. Thus, to support nursing work practices and guide their interventions for the care of elderly patients, technologies are tools that assist in the care and educational process (Campos *et al.*, 2016). For health and nursing, different types of technology are needed, since care is not expressed in a singular way. These technologies are divided into three categories: light, light-hard and hard technology. The first concerns the structuring of knowledge, such as theories and models, the second consists of the use of instruments and the third is heavier, being characterized by the use of more dense and sophisticated equipment (Merhy, 2002). Although population aging is notorious and with it the need to develop technologies that can support nurses in the clinical care of elderly people with CNCD, there is still no satisfactory knowledge about these tools (Toldrá *et al.*, 2017; Campos *et al.*, 2016). Therefore, it is imperative to seek to know the different types of nursing care technologies for elderly people with CNCD. Therefore, this study aimed to identify nursing care technologies for the elderly with chronic non-communicable diseases. After carrying out all the stages of the integrative review, the synthesis of knowledge on the theme "Nursing care technologies for elderly people with chronic non-communicable diseases", it is expected to offer support for nurses decision-making about care practice together to elderly people with these morbidities and to identify knowledge gaps in the development of research on nursing care technologies.

MATERIALS AND METHODS

It is an integrative literature review. To carry out this study, six steps were taken: definition of the guiding question of the review; literature search; establishment of inclusion and exclusion criteria for research; evaluation of included studies; interpretation of results and presentation of the synthesis of knowledge (Mendes; Silveira; Galvão, 2008). In this sense, the guiding question of the integrative review was: "What are the technologies of nursing care for the elderly with chronic non-communicable diseases?". To elaborate this question, the PICO strategy was used, with the P for population, patient or problem (elderly with chronic non-communicable diseases) and I for intervention or area of interest (nursing care technologies). Due to the type of review, it was not possible to use elements O and C that correspond, respectively, to the outcome and comparison between the intervention or group (Santos, 2007). To search for the manuscripts, the databases of the US National Library of Medicine (PUBMED), Latin American and Caribbean Health Science Information System (LILACS) and the Nursing Database (BDENF) were selected. The searches in each of them were delimited by controlled descriptors in Portuguese and English (Descriptors in Health Sciences and Medical Subject Headings) and by the Boolean

operator AND. Thus, the controlled descriptors were as follows: a) PUBMED: technology AND chronic disease AND aged AND nursing care; b) LILACS and BDENF: technology AND chronic disease AND elderly AND nursing care. The searches in these databases took place in May 2019 and were carried out by two reviewers independently, as recommended by the literature (Mendes; Silveira; Galvão, 2008). As inclusion criteria, the following were established: original manuscript published between 2008 and 2018, manuscript addressing nursing care technologies for people with chronic non-communicable diseases and manuscript available in full in English, Portuguese and Spanish. Review and reflection manuscript, editorials, theses and dissertations were excluded. The selection of studies followed the recommendations of the Preferred Reporting Items for Systematic reviews and Meta-Analyses – PRISMA method (Moher; Liberati; Tetzlaff; Altman, 2010) as shown in the diagram below.

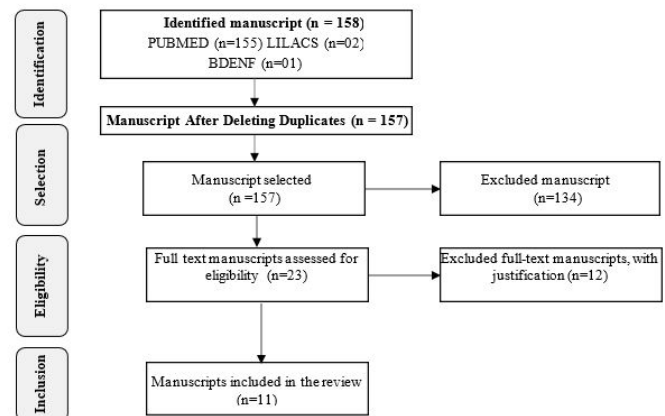


Figure 1. Flowchart of identification, selection and inclusion of manuscripts, adapted from PRISMA. Redenção CE, Brazil, 2019

Regarding the evaluation of the selected studies, the nomenclature for the type of study indicated by the authors was maintained. However, when the type of study was not clearly described by the researchers, the analysis was based on the concepts of scientific methodology of nursing researchers (Polit; Beck, 2011). In addition, the studies were classified as to the level of evidence in: Level I - systematic review or meta-analysis; Level II - randomized controlled clinical trial; Level III- controlled clinical trial without randomization; Level IV - well-designed cohort or case-control studies; Level V - systematic review of qualitative and descriptive studies; Level VI - descriptive or qualitative studies; and Level VII - opinion of authorities or expert report (Melnik, Fineout-Overholt, 2005). To extract data from the selected manuscripts, an instrument for data collection was used, validated by Ursi (Ursi, 2005). Subsequently, they were analyzed in a descriptive way and organized in summary tables, which covered the following information: title of the manuscript, author (s), journal, year of publication, objective (s), sample details, type of study and main results. Due to the similarity between the data found, they were grouped into two analytical categories, namely: light and light-hard technologies for the nursing care of the elderly with chronic diseases and hard type technologies for the nursing care of the elderly with chronic diseases.

RESULTS

Of the 11 selected manuscripts 14-22, 10 (90.90%) were found in the PUBMED database and 01 (9.09%) in LILACS. As for

BDENF, 01 manuscripts was identified. However, he was excluded because he was found at LILACS. Regarding the year of publication, one (9.09%) study was published in 2018, four (36.36%) in 2017, one (9.09%) manuscript in 2015, one (9.09%) manuscript in 2014, three (27.27%) in 2013 and one (9.09%) in 2012.

Regarding the language of the manuscripts, 10 (90.90%) were published in English and 01 (9.09%) in Portuguese. Regarding the level of evidence, six (54.54%) studies presented level VI, three (27.27%) level III, one (9.09%) level IV and one (9.09%) level II. The database, manuscript and level of evidence are described in Table 1.

Table 1. Summary of studies included in the integrative review. Redenção-CE, 2019

Data base	Manuscript title	Author (year)	Study type (level of evidence)
PUBMED	Functional status and annual hospitalization in multimorbid and non-multimorbid older adults: a cross-sectional study in Southern China	Wang <i>et al.</i> (2018)	Cross-sectional (VI)
PUBMED	Adherence to guidelines in patients with chronic heart failure in primary health care.	Giezeman <i>et al</i> (2017)	Cross-sectional (VI)
PUBMED	Understanding views on everyday use of personal health information: Insights from community dwelling older adults	Hartzler <i>et al</i> (2017)	Exploratory study (VI)
PUBMED	A prospective 2-site parallel intervention trial of a research-based film to increase exercise amongst older hemodialysis patients.	Kontos <i>et al</i> (2017)	Prospective study of parallel intervention (III)
PUBMED	Predicting Early Death Among Elderly Dialysis Patients: Development and Validation of a Risk Score to Assist Shared Decision Making forDialysis Initiation	Thamer <i>et al</i> (2015)	Retrospective observational cohort (IV)
PUBMED	Nurse Care Coordination and Technology Effects on Health Status of Frail Elderly via Enhanced Self- management of Medication: Randomized Clinical Trial to Test Efficacy	Marek <i>et al</i> (2013)	Randomized controlled study (II)
PUBMED	Clinical outcome and cost-effectiveness of a synchronous telehealth service for seniors and nonseniors with cardiovascular diseases: quasi- experimental study	Chen <i>et al</i> (2013)	Quasi-Experimental Study (nível III)
PUBMED	Deployment of assistive living technology in a nursing home environment: methods andlessons learned	Aloulou <i>et al</i> (2013)	Experimental study (III)
PUBMED	An exploratory study of the personal health records adoption model in the older adult with chronic illness	Logue, Effken (2012)	Exploratory study (VI)
PUBMED	bots to assist daily activities: views of older adults with Alzheimer's disease and their caregivers	Wang <i>et al</i> (2017)	Exploratory study (VI)
LILACS	Tecnologia educacional como estratégia de empoderamento de pessoas comenfermidades crônicas	Berardinelli <i>et al</i> (2014)	Descriptive study (VI)

Table 2. Classification of studies according to type of technology, chronic disease, main results and level of evidence. Redenção, CE, Brazil, 2019

Manuscript	Type of technology	Chronic disease	Main results	Level of evidence
A1 Wang <i>et al.</i> (2018)	Light-hard Functional Independence Measure	Multiple	There is a significant correlation between a lower score of the Functional Independence Measure and the increased risk of annual hospitalization in Chinese elderly people with multimorbidity.	VI
A2 Giezeman <i>et al</i> (2017)	Functional Independence Measure Light-hard	Chronic cardiac insufficiency	Adherence to diagnostic tests and pharmacological treatment recommended by the guidelines of the European Society of Cardiology and self-care behavior, using the European Heart Failure Self Care Behavior Scale in primary care is still incipient, encouraging the search for improvements in education and self-care of patients with Chronic heart failure.	VI
A3 Hartzler <i>et al</i> (2017)	Medida de Independência Funcional Light-hard	Multiple	Existing personal health information management systems are generally not designed to support wellness activities, highlighting the need to create a tool to support healthy aging.	VI
A4 Kontos <i>et al</i> (2017)	Functional Independence Measure Light-hard	Chronic renal insufficiency	The research-based program as a model to support promotion and adherence to exercise can be used to support the National Kidney Foundation's recommendation to improve dialysis patients	III
A5 Thamer <i>et al</i> (2015)	Functional Independence Measure Light-hard	Chronic renal insufficiency	Developed and validated a tool using a predictive risk score for early mortality after starting dialysis therapy.	IV
A6 Marek <i>et al</i> (2013)	Functional Independence Measure hard	Multiple	The coordination of the home care of the nurse, together with the medplanner device, was effective in home support of self-management of medicines for the elderly in conditions for better results in the clinical state	II
A7 Chen <i>et al</i> (2013)	Functional Independence Measure hard	Cardiovascular diseases	The telehealth service in elderly patients with cardiovascular diseases has been validated, showing how their intervention can decrease the rates of hospital admissions regardless of age.	III
A8 Aloulou <i>et al</i> (2013)	Functional Independence Measure hard	Mental disorder	The use of Ambient Assistive Living (AAL) technologies to assist the activities of elderly people with mild dementia has shown a significant contribution to the system's efficiency in detecting signs of health deterioration and abnormal behaviors.	III

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A9 Logue, Effken (2012)	Functional Independence Measure hard	Multiple	Younger older people have a more positive attitude towards the use of computers, they agreed that they had the resources to use PHRs. Older older adults reported less confidence in their ability to use Internet-based PHRs and did not realize that they had the resources to use them.	VI
A10 Wang <i>et al</i> (2017)	Functional Independence Measure hard	Alzheimer's disease	Elderly people with Alzheimer's disease expressed opportunities for robots to help with daily activities, but they did not want a robot. Caregivers identified numerous opportunities and were more open to robots.	VI
A11 Berardinelli <i>et al</i> (2014)	Functional Independence Measure light	Multiple	Educational technology can be used as a strategy for the empowerment of people affected by chronic diseases, through their involvement in group activities that encourage reflection, reasoning, the exchange of ideas and mutual respect.	VI

Given the similarity between the type of nursing care technologies addressed by the studies, they were divided into two categories: light and light-hard technologies for the nursing care of elderly people with chronic diseases and hard-type technologies for the care of nursing of elderly with chronic diseases. In this context, five (45.45%) manuscripts addressed light-hard technology and five (45.45%), hard technology. Thus, four (36.36%) studies brought the use of light-hard technology through the application of scales, guidelines and programs. One (9.09%) manuscript used this tool through personal health information management based on a health support information system. Regarding hard technology, of the five manuscripts that addressed this theme, four (80%) chose a device to be used for study. Thus, they listed: the telephone through the telehealth service; Ambient Assistive Living, which consists of a set of ubiquitous technologies, such as sensors, actuators, interaction devices that monitor and react to the individual's needs; the computer for personal health information management; and a robot to aid daily activities aimed at caring for the elderly with chronic disease. Still on hard technology, a study (20%) on self-management of medications in the elderly was identified, using a medication dispensing machine and a planner in their research. As for light technology, one (9.09%) manuscript addresses the involvement of people affected by chronic diseases through educational practices in group activities with encouragement for reflection, reasoning, exchange of ideas and mutual respect. With regard to the type of chronic diseases, two (18.18%) studies referred to chronic diseases in general, involving, for example, diabetes mellitus, peripheral vascular disease and heart disease. In addition, two (18.18%) manuscripts dealt with the use of nursing technologies for cardiovascular diseases and two (18.18%) for the elderly with chronic kidney disease (CKD). Finally, two (18.18%) studies sought technologies for the quality of life of patients affected by neurological pathologies, such as Alzheimer's disease.

DISCUSSION

In order to know the nursing treatment technologies for the elderly with chronic non-communicable diseases, the results of this study are of five (45.45%) manuscripts addressed to light-hard technology, five (45.45%) to hard technology and one (9.09%) is a lightweight technology. In view of this, the study was divided into two categories: light and light technologies for nursing care with chronic diseases and hard technologies for nursing care with chronic diseases. In order to know the nursing treatment technologies for the elderly with chronic non-communicable diseases, the results of this study are of five (45.45%) manuscripts addressed to light-hard technology, five (45.45%) to hard technology and one (9.09%) is a

lightweight technology. In view of this, the study was divided into two categories: light and light technologies for nursing care with chronic diseases and hard technologies for nursing care with chronic diseases (Abreu *et al.*, 2017). Heart failure and cardiovascular diseases were addressed with one (9.09%) manuscript each, using light-hard and hard technology respectively. These diseases are commonly associated with high rates of morbidity and mortality and high costs to society, mainly because of frequent hospitalizations (Giezeman *et al.*, 2017). The importance of such studies is aimed at reducing costs, decreasing hospitalization rates and the duration of hospitalizations in patients affected by such pathologies. As well as reducing morbidity and mortality and increasing the quality of life of these individuals (Giezeman *et al.*, 2017; Thamer *et al.*, 2015). Two manuscripts (18.18%) addressed CKD using light hard technology. High rates of "early mortality" among dialysis patients - especially among the elderly - have received greater attention (Chen *et al.*, 2013). Thus, the use of technology as a tool to facilitate shared decision-making, improve quality care, safety and reduce unnecessary services, makes it relevant in order to reflect on the reduction of mortality risks, as well as a better quality of life for these patients (Kontos *et al.*, 2017; Chen *et al.*, 2013). Two manuscripts (18.18%) using hard technology, addressed Chronic Neurological Diseases, one manuscript focused on the individual's impairment due to dementia and one manuscript focused on Alzheimer's Disease (AD). Elderly people with AD and other dementias generally need the support of family caregivers to perform daily activities. Difficulties arise when starting tasks, solving problems, executing sequences of activities and maintaining skills to perform meaningful activities (Wang *et al.*, 2016). Thus, these technologies are aimed at developing tools to preserve the elderly's sense of autonomy (Aloulou *et al.*, 2013; Wang *et al.*, 2016).

In this context, it is important to highlight that technologies aimed at elderly people with chronic diseases have the role of improving prevention, well-being and quality of life. In addition, they are useful tools to encourage self-care in this age group. This fact has a positive effect on survival and on the decrease in rates of hospital readmissions. With regard to the category on light and light-hard technologies for the nursing care of elderly people with chronic diseases, the integrative review allowed to identify only one study on light technology, which was developed in Brazil and published in Portuguese. This finding can be explained by considering that Brazilian research on the construction and improvement of hard technologies for the care of the elderly population with chronic diseases is still incipient, not corresponding to the increase in the prevalence of these conditions in the geriatric public. This is worrying, since the trend is the increase in the demographic

contingent of elderly Brazilians and the concomitant increase in cases of chronic non-communicable diseases (Tavares *et al.*, 2017). In this context, the Brazilian scientific literature shows a greater number of publications focused on light technologies, in the insertion of care for the elderly with chronic diseases. These studies address light technology through health education, based on conversations, lectures and group meetings to share experiences (Tavares *et al.*, 2017). This allows us to observe that Brazil still prioritizes affective relationships and bonds as an important technology in the care of the elderly living with CNCD, whether that relationship is established between patient-professional, professional-caregiver and / or patient-caregiver. In contrast, publications in English seek hard technology as a way of replacing the role of the professional / caregiver to a large extent with machines in an attempt to preserve, in a way, the individuality of the patient.

With regard to light-hard technology, five manuscripts were identified, published in English. In this sense, it was observed that research on the theme of soft technology for elderly people with chronic diseases is more prevalent in English. This fact shows the concern of other countries to invest in research that can predict future involvement, with the application of standards, guidelines and programs in which individuals are encouraged to take responsibility for their own well-being and care. Thus, they seek to reduce caregiver interventions, minimizing the burden that CNCD cause on the elderly family. Regarding the category on hard technologies for the nursing care of elderly people with chronic diseases, five studies were found, published in English. In this regard, a research contextualized the use of hard technology in an integral way for the provision of care and compared it with the use of technology together with the association of the performance of a professional nurse (Marek *et al.*, 2013). Another sought to assess the cost-effectiveness of a nursing service telehealth for elderly people with cardiovascular diseases in which a range of services was provided led by a cardiologist and a team of cardiovascular nursing specialists (Chen *et al.*, 2013). Therefore, it is worth noting that, in the health area, technological advances in the field of nursing have been inserted in different contexts, both in the care process and in educational (Sabino *et al.*, 2013). In view of this, different technologies, combining their use according to the needs of patients, must encompass the user in its entirety, that of the disease, that of life, that of desires, that of aspirations and expectations. Thus, such aspects should be considered when choosing the appropriate technology for the clinical and life context of each elderly person with CNCD. The focus of these technologies should be to assist and equip nurses to conduct the care process for the elderly with these morbidities.

Conclusion

This research sought to know the technologies of nursing care for elderly people with CNCD. The integrative review highlighted that most of the identified manuscripts were published in English, and had level of evidence VI, with an equal prevalence of research on light-hard and hard technology. In addition, there was a greater number of studies on nursing technologies for CNCD in general, followed equally by studies focused on cardiovascular and cardiac disorders; CKD, neurological diseases. Nevertheless, this integrative review has some limitations to be overcome in later research. Among them, the fact that the data analysis was

developed in a descriptive way, considering that the association of data from different types of studies, as in the quantitative and qualitative approach, is a complex process that can lead to bias in the elaboration of the results of the review. In this perspective, the need for further research on nursing care technologies for elderly people with chronic non-communicable diseases is highlighted. Such studies may be directed to the types of technologies most used by nurses with elderly people living with chronic diseases in Brazil, or, still, on the use of these tools in a specific clinical context, such as diabetes mellitus and systemic arterial hypertension, two pathologies with ascending prevalence in Brazil and worldwide. In summary, the findings of this integrative review bring important contributions to nursing and the health area. One of these contributions is to assist researchers in identifying technologies that can be adapted for clinical implementation with elderly people with chronic diseases in Brazil. In addition, the present study is a source for expanding the knowledge of nurses in care, providing them, along with other research, means for a nursing practice based on scientific evidence.

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