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Construction of a Classifying Technology for Geriatric Emergency Care for Caregivers of the Elderly

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Abstract *— To develop a printed classifier instrument to guide geriatric emergency care for caregivers of the elderly. This is a literature review of the last 10 years, aiming to elucidate the theme and thus, based on the information obtained, build the printed instrument for the geriatric public. Therefore, this work took place in two stages, the first being the search for articles on online search platforms and the second the construction of the proposed technology. The applicability of educational instruments in health is of paramount importance, even for those who do not have training in the area, as is the reality of many caregivers in the country, so the*

Keywords* — *Elderly Caregivers, Geriatrics, Health Education, Risk Classification.

instrument built was based on colors already used for a better understanding of the tool. It is concluded that the applicability of the tool is easy to understand and can help in the assessment and decision-making of caregivers, thus favoring care, adequate prognosis and in a timely manner for the elderly.

I. INTRODUCTION

Professional caregivers of the elderly is currently an emerging occupation worldwide, although in Brazil, according to the Brazilian Institute of Geography and Statistics (2018), in the year 2060, the number of elderly people over 65 years old should triple and represent 25.5% of the Brazilian population. However, studies show that evaluation and diagnosis difficulties by health professionals are motivated by multiple comorbidities, changes in mental status and communication difficulties presented by the elderly in emergency situations (Mish et al, 2014; Santos et al, 2016).

According to Figueiredo et al, (2021), the long-term caregiver at home is not qualified enough to offer services to the dependent elderly, nor to assist and care for fragile lives. In addition, the occupation is not yet regulated and the caregiver's role diversion to domestic activities is common. In this way, population aging is one of the biggest challenges for contemporary public health, since the elderly consume more health services, for example, the increase in hospital admissions and the length of bed occupancy (Lima & Veras, 2013).

Given the facts, Emergency Care Units (UPA) are commonly sought by the elderly however, this displacement is not always necessary, which contributes to the capacity in health units. In this way, as a proposal to reduce and meet this demand, the National Humanization Policy (PNH) and QualiSUS were created, which included classifying screening of patients, seeking to prioritize care according to the severity of the case and no longer in order of arrival. (Silva & Gutierrez, 2018).

A safe, comprehensive and effective model of care for urgent care is the Manchester System. Structured in flowcharts that represent patient's main complaint and composed of discriminators that contain the patients' signs and symptoms, listing clinical priorities by severity, and with a maximum term for care. Inspired by this system, several devices were created in order to improve the quality of services provided to the elderly (Manchester Triage Group, 2010).

According to Chumbinho (2018), when they built a digital blog aimed at caregivers and family members of elderly people with Alzheimer's, they admitted that informational support technologies are of great importance, as they help in the state of health and in the staging of disorders. Therefore, the acquisition of skills in assistive technologies for the caregiver are tools that guide the resolution of work demands and cooperate with their resolving role. For this, advisors must mediate knowledge in a didactic way for application in their routine and thus reduce work overload and stress. In this constant, Melo et al. (2017), this situation is observed in more than 42% of caregivers, consequently, the provision of an effective informational instrument provides a positive impact in reducing caregiver stress.

In this perspective, the present study proposed the construction of a printed instrument that classifies signs and symptoms of risk to mediate geriatric emergency care for caregivers of the elderly and thus facilitate decision-making through risk prioritization according to the event severity. In addition, technology must optimize medical care and cooperate for preventable life-threatening procedures.

II. MATERIALS AND METHODS

This is a descriptive literature review aimed at the construction of a care and educational technology linked to the Professional Master's Graduate Program in Health Teaching-Medical Education at the University Center of the State of Para (CESUPA). According to Nietzsche et al. (2005) aims to recognize the need for geriatric emergency care for caregivers of the elderly, developed in the period from 2020 to 2021.

The product is intended for those who work as “elderly caregivers”, regardless of the length of time in the occupation, providing care in homes and/or hospitals with or without remuneration. Therefore, for the framework of the study, the following steps were carried out:

The first stage provided the theoretical support for the construction of the product through a literature review, whose objective was to identify the available scientific material referring to geriatric risk syndromes, the occupation of caregivers of the elderly and the technologies available in the respective databases. Virtual Health Library (BVS), Scielo, Cochrane and Pubmed with a time frame of the last 10 years.

The search descriptors were: Elderly Caregiver; Technology in Care Classification; Risk rating; Seniors. In the possibility of crossing the information and filtering, the Boolean operators "AND" and "OR" were used in the databases and filters for tracking articles in Portuguese, Spanish and English, available in full and free of charge and respecting the period of 10 years. . The search for the material followed the following steps: Identification of articles in scientific databases; Reading the titles of the studies as an inclusion criterion; Reading abstracts; Read the articles in full.

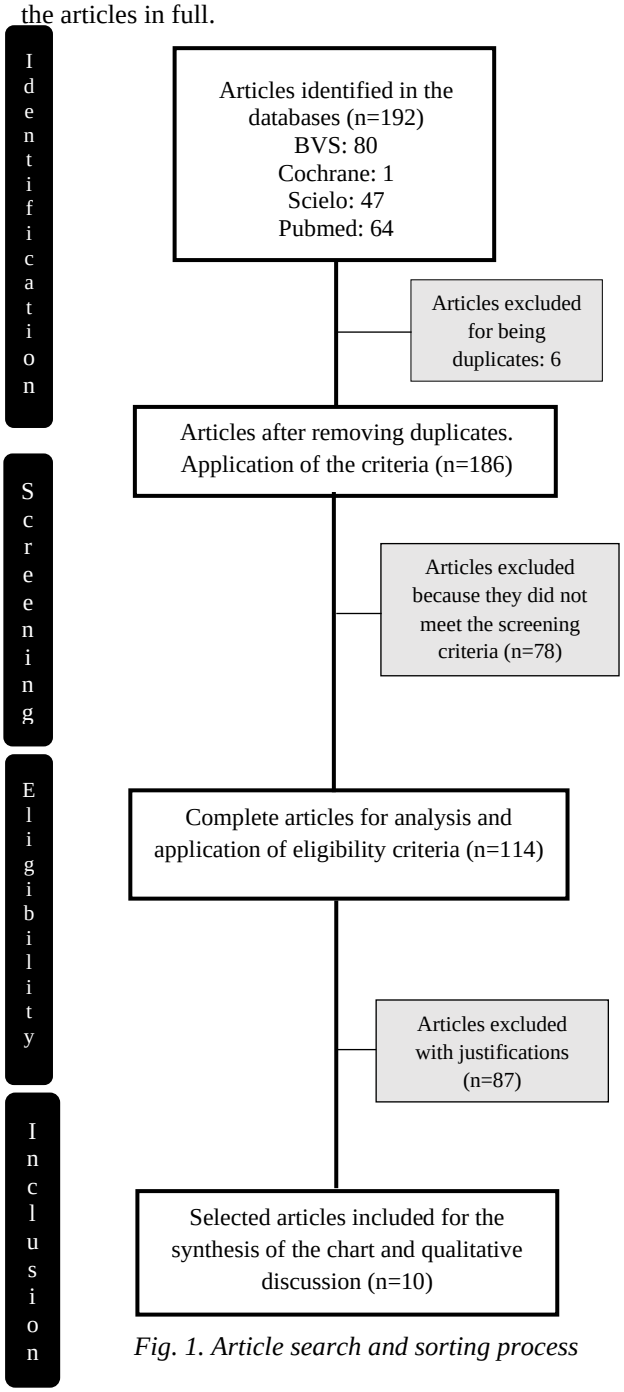

Fig. 1. Article search and sorting process

For the exclusion criteria, duplicate articles, productions such as experience reports, narrative and integrative reviews were removed. Below is the flowchart referring to the stages of identification, selection and inclusion of articles by database and the total number of studies included at the end of the survey.

Subsequently, the second stage was carried out, which consisted in the operationalization of the construction of the technology for risk assessment, in which the following protocols were taken into account: Manchester, Trauma Guideline and the Reception Protocol with Risk Assessment and Classification of the Ministry of Health. These protocols were used because they present attributes that corroborate the objective of the study, such as classification by colors according to the priority of the service and because they present access to an objective and didactic reading that is easy to understand.

In sequence, there was the elaboration of the proposal, directed to be used as a health education tool according to the Manchester risk classification and the Classification Protocol of the Ministry of Health.

III. RESULTS

In the table below are organized the studies that evaluated the applicability of educational technologies in health and operational protocols that help in the decision-making of the elderly caregiver.

Table 1. Applicability and performance evaluation of educational technologies and operational protocols that guide caregivers' decisions.

Authors	Title	Aim	Type of study	Main results
O'Caoimh et al. (2016)	Measuring the effect of carers on patients' risk of adverse healthcare outcomes using the caregiver network score	To examine the association between caregiver type and the caregiver network subtest of the Risk Screening Community Instrument (RISC), a five-point Likert scale scored from one ("can manage") to five ("absent/responsibility ")	Observational Cohort	Most patients had a primary caregiver (582/779; 75%), who was their child (200/582; 34%). The highest incidence of adverse outcomes occurred when state-provided care was the only support; and lower when the service was private. The need for institutionalization was observed in high-risk caregivers, when compared to low-risk ones; this association was stronger for the perception of difficulty in managing issues in the medical domain and associated with death.
Papa et al. (2020)	Review and selection of online resources for carers of frail adults or older people in five european countries: mixed-methods study.	The study aimed to review and select apps and websites that offer useful functionality for informal caregivers of frail or elderly adults in 5 European countries..	Qualitative and quantitative exploratory study	After searching 224 resources, 38 resources (38/224, 17.0%) were specifically aimed at caregivers, addressing the management of health disorders and focusing mainly on neurodegenerative diseases. It was observed that caregivers had no prior knowledge of any resource specifically aimed at caregivers, the main barriers to the use of resources were the low digital capacity of caregivers and the reliability of health-related apps and websites.
Schölz-Dorenbos et al. (2012)	Validation study of the prototype of a disease-specific index measure for health-related quality of life in dementia	To develop and validate the prototype of a dementia-specific HRQoL index measure: Dementia Quality of life Instrument (DQI), as a first step in assessing the health status of dementia.	Qualitative and quantitative cross-sectional study	Differences in classification and classification behaviors were small. Mood was rated (≥3.3) and rated (≥8.2) as the most, Orientation as the least important (rating ≤2.6, value 7.5) was the health domain for dementia
García-Arango et al. (2021)	Predictive validation of a functional classification method in older adults	Assess the predictive validity of a functional classification (FC) method on the use of emergency services and hospitalization, mortality and costs with elderly health care.	Retrospective cohort study	The risk of death (odds ratio [OR]: 1,767, 3,411, 8,525), hospitalization (OR: 1,397, 2,172, 3,540), and a high cost of health care (OR: 1,703, 2,369; 5,073) increased as there was a deterioration. in the FC classification, classes 2B, 3 and 4, respectively. The predictive model for the death outcome showed good discrimination (C statistic = 0.721) and calibration (HL statistic = 10,200; P = 0.251).
Lusardi et	Determining Risk	Firstly, to assess the	Systematic	Five history questions, 2 self-report measures,

al. **(**2017**)**	of falls in community dwelling older adults: A systematic review and meta-analysis using posttest probability	predictive ability of history questions, self-report measures, and performance-based measures to assess the risk of falling in community-dwelling older adults by calculating and comparing post-test probability (PoTP) values to individual test/measures. Second, to assess the utility of cumulative PoTP for combination measures.	review with meta-analysis	and 5 performance-based measures may have clinical utility in assessing fall risk based on cumulative PoTP. They are currently the most proven functional measures to determine an individual's risk of falling.
Sanchis-Soler et al. **(**2021**)**	Reduced caregiver overload after supervised training in pluripathological and palliative elderly	To know the relationship between the level of independence of a group of multiple and palliative clinical-pathological elderly (PCA-P) and the burden of their caregivers, after a multicomponent training program adapted to the home environment	Longitudinal study of quantitative type	The BI improved with supervised training ($p<0.05$) and remained or fell slightly, although not significantly, increasing autonomy. These improvements were accompanied by a reduction in caregiver burden, with similar dynamics, especially in caregivers in the <79 years and non-walking group.
Netto **&** Petraroli **(**2020**)**.	Modeling a system for telemonitoring of elderly people with a chronic condition based on biotelemetry	To present the results of the application of a modeling proposal for a platform based on biotelemetry that is capable of acting in the detection of intervention points or levels of application of preventive measures in the health-disease process of the elderly with a chronic condition	Qualitative cross-sectional study	Operational protocols to guide measurement parameters and support self-care, in addition to increasing the elderly's sense of security. As a direct consequence, there was an improvement in the treatment outcomes. It is understood that the implementation of this type of system can reduce the number of trips to the emergency room and possible hospital admissions, in addition to avoiding unnecessary medical examinations..
Baixinho **&** Dixe **(**2017**)**	Team practices in the prevention of falls in institutionalized elderly:	The study aimed to build and determine the psychometric characteristics of the scale of practices and	Literature review and observational study	The team discussion on preventive measures is not always maintained, allowing different elements of the team to value different measures. The scale has good psychometric characteristics and can be used in research and

	Construction and validation of a scale	behaviors of teams in managing the risk of falling in institutionalized elderly people.		clinical practice to assess the practices and behaviors of teams in managing the risk of falls in institutionalized elderly people.
Mamani et al. (2019)	Elderly caregivers: knowledge, attitudes and practices about falls and their prevention.	To investigate the knowledge, attitudes and practices of informal caregivers of the elderly about falls and their prevention	Descriptive cross-sectional study	The study points out that more than half of the participants are aware of falls and identify them as a problem, as well as point out some risk factors and prevention measures. More than half of the caregivers are not favorable to the prevention of falls. Finally, it is concluded that caregivers know about falls and their prevention, but superficially.
Ceccon et al. (2021)	Aging and dependence in Brazil: Sociodemographic and care characteristics of older adults and caregivers	To identify sociodemographic and care characteristics of dependent elderly people, formal caregivers and family members in cities in different Brazilian regions.	Cross-sectional study	Burden, illness and social problems were found among family caregivers. Black women without formal employment, little or no training for the role and low remuneration predominated among formal caregivers and care was associated with household chores.

Based on the theoretical contribution of the analyzed studies, the construction of the educational care technology entitled: Geriatric Riscograma was graphically structured in the form of a disk, organized through the clinical situations of the elderly and clinical classifications according to the priority of care: Immediate care (red color)) Service in up to 60 minutes (yellow color) and Minor urgency (green color). They were classified as the need for immediate care when the elderly person has difficulty breathing and articulation of words, tachycardia and altered state of consciousness. Burns, presence of abdominal pain, minor dyspnea and headache were included as a need for hospital care within 60 minutes. In the classification of minor urgency, those who present with injury, diffuse abdominal pain, minor headache, psychiatric symptoms and diarrhea. For each clinical situation group, decision-making is suggested to the caregiver.

The graphic diagramming of the technology was built in the two-dimensional vector drawing program for graphic design corel draw version 2018 by corel corporation, a color gradient with nuances of red, yellow and green was used to represent the highlight of information such as classification, symptoms and behaviors required by the caregiver. We opted for dimensions of 15 cm in diameter, that is, 7.5 cm in radius, made for printing on rigid material of the plastic type and waterproof adhesive, aiming at the durability and ease of cleaning the technology.

IV. DISCUSSION

According to the survey of the studies of this literary review, the contribution and the power of the caregiver of the elderly in the necessary care that favor the good prognosis of those who depend on help in their care routine are undoubted. Therefore, taking into account the findings of the study by O'Caoimh et al. (2016), the absence of a professional linked to the health area increased the incidence of adverse effects in the geriatric patient, especially in the caregiver's perception of managing health problems that required specific information from the medical area related to the risk of death. This fact is associated with probable theoretical and practical insecurities that have been consolidated over time in their professional life, and if remedied, should provide more effective decision-making in life-threatening situations.

Caregivers still need training and qualification with regard to technological resources and access to health sites. In the study by Papa et al. (2020), who investigated the proportion of technological resources aimed at caregivers of the elderly with specific neurodegenerative diseases, only 17% included this group of professionals and most of the population of caregivers studied did not even have prior knowledge of any technological resource. Although the virtual scenario demonstrates greater accessibility to applications through smartphones, for example, resistance from some groups is noticeable.

Therefore, the construction of physical tools such as classifying disks for various health problems can reduce the negative impacts of the technological inability of caregivers and even the elderly accompanied. Furthermore, for Scholzel-Dorenbos et al. (2012), it is important to agree on the level of knowledge about clinical signs and symptoms related to dementia, and in this way they admit that this assessment is insufficient in the leveling of health knowledge of the caregiver of the elderly.

Likewise, the functional classification of the patient at the time of reception at the health institution is undoubtedly irreproachable, as it gathers information that helps in directing them to specific care. In the absence of functional or outdated classification, health and death costs increase. Therefore, functional classifications can encourage the construction of informational and educational technologies for caregivers. As an example, the tool produced by Lusart et al. (2010), who, through information on the natural history of the disease, patient self-report and performance-based measures, demonstrated clinical utility in the assessment of the risk of falling through cumulative points (scores) and are currently the most proven functional measures for determine the individual risk of falling (García-Arango et al, 2021).

In addition, caregivers have work overload, especially in the groups of elderly people over 79 years of age and those who do not walk. According to Sanches-Soler et al. (2021), patient autonomy can improve when training on palliative health care is provided at the patient's home, in addition to improving autonomy and reducing the caregiver's workload. In this way, the operational protocols that guide the safety of the elderly and, therefore, improve treatments, reduce the number of visits to health institutions, reduce the need for unnecessary exams, in the same way, the exposure of the patient to the hospital environment and, therefore, less cost to health services (Netto & Petraroli, 2020).

Baixinho & Dixe, (2017), admit that there is no consensus and standardization of prior knowledge about the physical risks of the elderly in their routine, and there are professionals who are unfavorable to preventive measures against the risk of falling. Thus, risk assessment models are necessary among professionals who work with the elderly, since most of the body of professionals is formed by women with low schooling in which there is physical and mental overload, diseases and social problems. are also among the caregivers. Additionally, black women without formal employment, with little or no training for the role and low pay still predominate (Mamani et al, 2019; Ceccon et al, 2021).

Therefore, there is a real need for facilitating proposals in the classification of daily geriatric risk situations, which, although growing, there are still few studies that aim to build informational products for caregivers of the elderly, such as the construction of a facilitator disk geriatric risk classification. Thus, the technology proposed in this study aims to offer direct and indirect benefits in the short and long term, respectively. In summary, the construction of the product should improve the quality of life of the elderly, by favoring prognostic factors for health and providing professionals with better results in the care provided.

V. CONCLUSION

The need for technologies that facilitate care and universal are of paramount importance in the process of evaluating symptoms and classification in the urgency to maintain the patient's health, the elderly population in the country is constantly growing and with a gradual inversion of the age pyramid that has been occurring in the world. Therefore, the development of technologies and tools that are easy to understand and handle, aimed at the elderly population, is irrefutably necessary.

REFERENCES

[1] Ayerbe, L. et al. (2013). Natural history, predictors and outcomes of depression after stroke: systematic review and meta-analysis. *Br J Psychiatry*, 202(1): 14-21.

[2] Little, C. L, & Say, M. A. (2017) Practices of teams in the prevention of falls in institutionalized elderly: construction and validation of a scale. *Text & Context-Nursing*, 26(3): 1-10.

[3] Ceccon, R. F. et al. (2021). Aging and dependence in Brazil: sociodemographic and care characteristics of older adults and caregivers. *Science & Public Health*, 26:17-26.

[4] Lead, V. F. (2018). The definition of the professional profile of the domestic worker: skills and personal traits. Dissertation: *University Institute of Lisbon*, Lisbon, 52.

[5] Couto, A. M. et al. (2016). Experiences to be a family caregiver of dependent elderly in the home environment. *Revista da Rede de Enfermagem do Nordeste*, 17(1): 76-85.
[6] Figueiredo, M. L. F. (2021). Formal caregivers of dependent elderly people at home: challenges experienced. *Science & Public Health*, 26:37–46.
[7] García-Arango, V. et al. (2021). Predictive validation of a functional classification method in older adults. *Panamerican Journal of Public Health*, 45: e15.
[8] Lima, C. M. F. & Veras R. (2013). Public health and aging. *Public Health Notebooks*, 19(3).
[9] Lusardi, M. M. et al. (2017). Determining risk of falls in community dwelling older adults: a systematic review and meta-analysis using posttest probability. *Journal of geriatric physical therapy*, 40(1): 1.
[10] Macena, W. G. et al. (2018). Physiological changes resulting from aging. *Mosaicum Magazine*, 27: 223-238.
[11] Mamani, R. N. A. et al. (2019). Elderly caregivers: knowledge, attitudes and practices about falls and their prevention. *Brazilian Journal of Nursing*, 72: 119-126.
[12] Manchester Triage Group. (2010) Manchester risk classification system: risk classification in urgency and emergency. Belo Horizonte. *Brazilian Risk Classification Group*, 210p.
[13] Melo, L. A. et al. (2017). Socioeconomic, demographic and regional factors associated with population aging. Brazilian *Journal of Geriatrics and Gerontology*, 20(4): 494-502.
[14] Misch, F. et al. (2014). Impact of observation on disposition of elderly patients presenting to emergency departments with non-specific complaints. *Plosone*, 9(5): 1-7.
[15] Netto, A. V & Petraroli, A. G. (2020). Modeling a system for telemonitoring of elderly people with a chronic condition based on biotelemetry. *Journal of Health Informatics*, 12(1): 17-23.
[16] O'Caoimh, R. et al. (2016). Measuring the effect of carers on patients' risk of adverse healthcare outcomes using the caregiver network score. *J Frailty Aging*, 5(2): 104-10.
[17] Papa, R. et al. (2020). Review and selection of online resources for carers of frail adults or older people in five European countries: Mixed-methods study. *JMIR mHealth and uHealth*, 8(6): e14618.
[18] Sanchis-Soler, G. et al. (2021). Reduction of caregiver burden after supervised training in pluripathological and palliative elderly. *Notebooks of Psychology of Sport*, 21(1): 271-281.
[19] Santos, M. T. et al. (2016). Elder-friendly emergency services in Brazil: necessary conditions for care. *Journal of the USP School of Nursing*, 50(4): 592-9.
[20] Schölzel-Dorenbos, C. J. M. et al. (2012). Validation study of the prototype of a disease-specific index measure for health-related quality of life in dementia. *Health and quality of life outcomes*, 10(1): 1-11.
[21] Speake, D. (2013) Detecting high-risk patient with chest pain. *Emergency Nursing*, 11(5): 20-32.
[22] Silva, H.S. & Gutierrez, B. A. O. (2018). Education as an instrument of change in the provision of care for the elderly. *Educar em Revista*, 34(67): 283–296.
[23] Thim, T. et al. (2012) Initial assessment and treatment with the Airway, Breathing, Circulation, Disability, Exposure (ABCDE) approach. *Int J Gen Med*, 2(17): 117-21.