Fall prevention diagram for older adults: an integrative review

Diagrama de prevenção de quedas para pessoas idosas: revisão integrativa

Diagrama de prevención de caídas para personas mayores: revisión integradora

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Abstract

Objective: To propose a fall prevention diagram for older adults, based on Nola Pender's Health Promotion Model.

Methods: Diagram construction was based on Nola Pender's model and its elements. For this, an integrative review study was carried out with the objective of collecting data on individual characteristics and experiences, behavior-specific cognitions and affect and behavioral outcome for fall prevention. After collecting this information, a similarity analysis of the selected studies was carried out using IRaMuTeQ. The elements obtained from similarity analysis facilitated the grouping of studies regarding the elements found and thus provided fall prevention diagram organization.

Results: The final sample consisted of 54 articles, divided according to the elements of Nola Pender's model: 36 addressed individual characteristics and experiences, 40 referred to behavior-specific cognitions and affect, and 20 referred to behavioral outcome. The elements obtained from the similarity analysis generated a semantic range of the most frequent words: fall, prevention, woman and fear. The least frequent words were cognition, self-efficacy, transportation and planning, which contributed to diagram construction.

Conclusion: From the review, a diagram was prepared, which favored identifying personal factors, barriers and facilities for a desirable behavior to prevent falls.

Resumo

Objetivo: Propor um diagrama de prevenção de quedas para pessoas idosas, baseado no Modelo de Promoção da Saúde de Nola Pender.

Métodos: A construção do diagrama foi embasada no modelo de Nola Pender e em seus elementos. Para isso, foi realizado um estudo de revisão integrativa, com o objetivo de coletar dados sobre características e experiências individuais, sentimentos e conhecimentos e adoção de comportamento saudável para prevenção de quedas. Após a coleta dessas informações, realizou-se análise de similitude dos estudos selecionados por meio do IRaMuTeQ. Os elementos obtidos da análise de similitude facilitaram o agrupamento dos estudos quanto aos elementos encontrados e, assim, proporcionaram a organização do diagrama de prevenção de quedas.

Resultados: A amostra final foi constituída de 54 artigos, divididos de acordo com os elementos do modelo de Nola Pender: 36 abordavam características e experiências individuais, 40 sentimentos e conhecimentos, e 20 eram referentes ao comportamento. Os elementos obtidos da análise de similitude geraram um leque semântico de palavras mais frequentes: queda, prevenção, mulher e medo. Já as palavras menos frequentes foram cognição, autoeficácia, transporte e planejamento, os quais contribuíram para a construção do diagrama.

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Conflict of interest: nothing to declare.

Conclusão: A partir da revisão, elaborou-se um diagrama, que favoreceu a identificação dos fatores pessoais, barreiras e facilidades, para um comportamento desejável à prevenção de quedas.

Resumen

Objetivo: Proponer un diagrama de prevención de caídas para personas mayores, basado en el modelo de promoción de la salud de Nola Pender.

Métodos: La elaboración del diagrama se basó en el modelo de Nola Pender y sus elementos. Para tal fin, se realizó un estudio de revisión integradora con el objetivo de recopilar datos sobre características y experiencias individuales, sentimientos y conocimientos y adopción de un comportamiento saludable para la prevención de caídas. Después de recopilar la información, se realizó un análisis de similitud de los estudios seleccionados mediante IRaMuTeQ. Los elementos obtenidos del análisis de similitud permitieron agrupar los estudios respecto a los elementos encontrados y, de esta forma, proporcionaron la organización del diagrama de prevención de caídas.

Resultados: La muestra final estuvo compuesta por 54 artículos, divididos de acuerdo con los elementos del modelo de Nola Pender: 36 abordaban características y experiencias individuales, 40 sentimientos y conocimientos y 20 eran sobre el comportamiento. Los elementos obtenidos del análisis de similitud generaron un conjunto semántico de palabras más frecuentes: caída, prevención, mujer y miedo. Por otro lado, las palabras menos frecuentes fueron: cognición, autoeficacia, transporte y planificación, que contribuyeron para la elaboración del diagrama.

Conclusión: A partir de la revisión, se elaboró un diagrama que favoreció la identificación de los factores personales, barreras y facilidades para un comportamiento conveniente en la prevención de caídas.

Introduction

Fall accidents are one of the main causes of hospitalization and mortality of older adults worldwide, with a prevalence of 24 to 50.8% in people over 60 years of age.[1] In Brazil, the hospitalization rate for this condition was 38.6 per 10,000, totaling 1.48 million hospitalizations. Among the regions that showed the greatest increase in the number of fall accidents are the Northeast, the Central-West and the South, presenting, on average, annual hospital expenses of around R$ 135 million.[2]

Expenses related to this condition as well as the impact generated on quality of life gain new prominence in terms of its management and risk prevention within the scope of clinical and public health initiatives, with the behavioral factor being an important aspect to be worked on.[3,4]

Models capable of working on behavioral aspects can have a positive effect as a health promotion strategy in relation to this condition. Conceptual references are understood as models, developed from interpretations of a particularity of the environment, based on abstractions, in which it is possible to build a more solid basis for more effective practice. They can be represented by symbols, drawings, conceptual maps and/or diagrams.[5] Within the scope of health promotion, using models provides a better understanding of individuals' health problems as well as directs and encourages the search for answers that meet the needs and interests of people involved with the aim of promoting health and preventing diseases/diseases.[6]

Among the theoretical models aimed at behavioral changes, Nola Pender's Health Promotion Model stands out, which describes that cognitive processes related to behavioral change can influence health status, emphasizing health promotion behaviors, identifying personal risk factors and enhancing the adoption of desirable behavior. Embracing health-promoting behaviors is essential for preventing falls.[7,8]

Using Pender's Health Promotion Model can help in description and mapping of personal factors, activity-related affect about falls and health-promoting behavior related to their prevention in the older adult population. A strategy based on Pender's Health Promotion Model can provide health professionals, managers and public policy makers with an instrument for understanding the phenomenon of preventing falls, strengthening gerontological practice.

Thus, the objective was to build a fall prevention diagram for older adults based on Pender's Health Promotion Model.

Methods

To construct the diagram, Pender's Health Promotion Model and its elements were used, whose bases and theoretical sources are the perspec-

tive of holistic nursing, social cognitive psychology and learning theory.[9] The model is based on three main elements translated from Health Promotion in Nursing Practice: personal characteristics/experiences of individuals/groups; behavior-specific cognitions and affect; behavioral outcome.[7]

Thus, an integrative review was carried out to identify individual characteristics and experiences, behavior-specific cognitions and affect, and behavioral outcome regarding fall prevention. The steps were followed: choosing the research question; definition of inclusion and exclusion criteria for studies; sample selection; inclusion of selected studies; analysis of results, identifying differences and conflicts; and discussion of data.[10] This study followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guideline Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) recommendations.[11]

The search was defined using the PICo strategy – Population, Intervention, Context.[10] The population of interest were older adults residing in the community; the intervention was the desirable behavior for preventing falls; and the context were personal characteristics, identification of barriers and knowledge for preventing falls. The following guiding question was constituted: What are the personal characteristics, knowledge and desirable behaviors for preventing falls in older adults in the community?

Studies were included without restrictions regarding the year of publication and language, with people aged 60 and over, who lived in the community and who answered the research question. Duplicate studies were excluded.

The selection, assessment and characterization procedures of articles were carried out by two researchers in pairs. The search was carried out between January and February 2022 in the Medical Literature Analysis and Retrieval System Online/National Library of Medicine (MEDLINE®/PubMed®), Scopus, Embase, Web of Science, and Latin American and Caribbean Literature in Health Sciences (LILACS) databases.

In order to expand the search results, natural language terms associated with controlled health terminology descriptors from Health Sciences Descriptors (DeCS) and Medical Subject Headings (MeSH) were adopted, considering the search strategy: ("personal factors" OR "risk factors" OR "cultural factors" OR "biological factors") AND (barrier OR difficulty OR "self-efficacy" OR knowledge) AND (behavior OR intervention) AND (falls OR "accidents falls") AND (elderly OR elder OR aged OR old OR aging). The Rayyan application was used as a tool for archiving, organizing and selecting articles.[12]

Data collection was performed by extracting information regarding study (authors, year of publication, study design, sample) and model element characteristics such as: individual characteristics and experiences (biological, psychological and sociocultural factors); behavior-specific cognitions and affect (perceived benefits of action, perceived barriers to action, perceived self-efficacy, activity-related affect, interpersonal influences, and situational influences); and behavioral outcome on fall prevention (commitment to a plan of action, which changes did older adults accept to participate in; immediate competing demands, which older adults have no control over when adopting behavior; preferences, which older adults have control over changing; and behavioral outcome).

After collecting this information, the results were organized according to Pender's Health Promotion Model diagram. At that moment, a similarity analysis was carried out using the *R interface for the Analyzes Multidimensionnelle de Textes et de Questionnaires* (IRaMuTeQ), 0.7 alpha 2. Co-occurrences between the words were identified, and the result indicates the connection between them.[13]

Results

In the initial search, 2,363 scientific records were identified. When transferring the records to the Rayyan software, 789 were excluded due to duplication, leaving 1,574. After reading the titles and abstracts, 1,382 were excluded as they did not meet the objective of the study, leaving 192 for the next stage. At this stage, a complete reading was carried
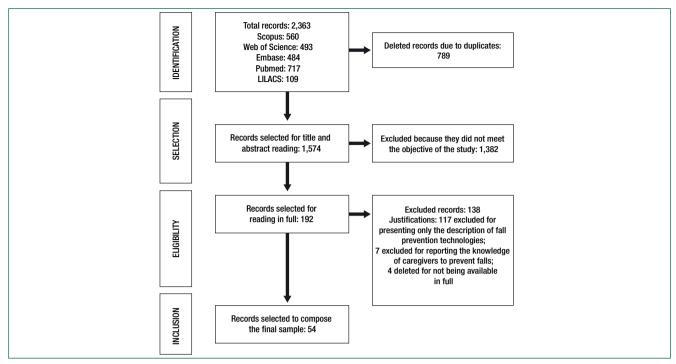
Figure 1. Article selection process flowchart

out; after the consensus meeting, 138 were excluded. The final sample consisted of 54 records. Figure 1 presents the selection process for this research.

Regarding study characterization, the time period was from 1988 to 2021, with the years with the highest prevalence being: 2018 (16.7%; n=9), 2017 (12.9%; n=7), 2019 (11%; n=6), 2021 (9.2%; n=5), 2015 (9.2%; n=5), 2020 (5.5%; n=3), 2011 (5.5%; n =3) and 2009 (5.5%; n=3). As for the method, 46.3% (n=25) were cross-sectional, 27.8% (n=15) were cohort, 14.9% (n=8) were qualitative, 4.6% (n=3) were case-controls, 4.6% (n=3) were experimental and 1.8% (n=1) were mixed studies. The places with the highest prevalence were 27.8% (n=15) United States, 16.7% (n=9) Australia, 9.3% (n=5) Brazil, 5.6% (n=3) Canada and 5.6% (n=3) India. After the similarity analysis, co-occurrences between the words and indications of the connection between the terms were identified (Figure 2), generating a semantic range of the most frequent words in the text, grouped into central and peripheral zones. In the central zone, the most frequent term was fall and was closer to the terms prevention, woman, fear, older adults, age, risk factor. In the most peripheral area, the least frequent terms

were: cognition, self-efficacy, transportation, planning, lighting, ambulation, disability, self-management, cane and flexibility.

The elements obtained from similarity analysis facilitated the grouping of studies regarding the elements found. However, the researchers separated the articles according to the elements of Pender's Health Promotion Model (Figure 3). Of the 54 articles, 36 referred to individual characteristics and experiences, 40 to behavior-specific cognitions and affect, and 20 to behavior outcomes. It is important to highlight that some articles presented more than one element in their results.

Individual characteristics and experiences

The 36 studies showed that the personal factors of older adults that increase the risk of falls are being female, age >70 years, history of falls in the last 12 months, low education (<6 years of study), living alone, low economic status, cognitive impairment, dementia, comorbidities (mainly Parkinson's, stroke, diabetes, urinary and fecal incontinence, and osteoarthritis), underweight or malnutrition, gait and balance disorders, visual and hearing impairment, poor health perception, mood disorder
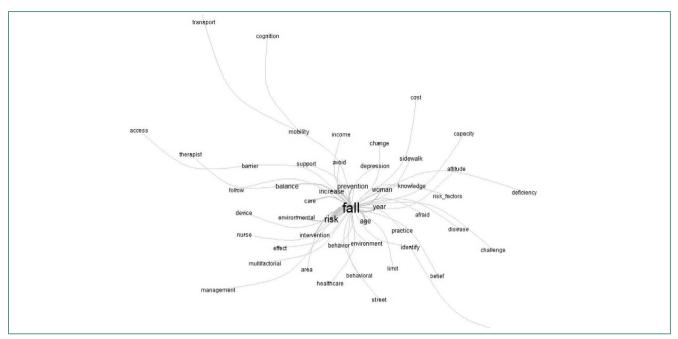
Figure 2. Similarity analysis between words to construct the fall prevention diagram
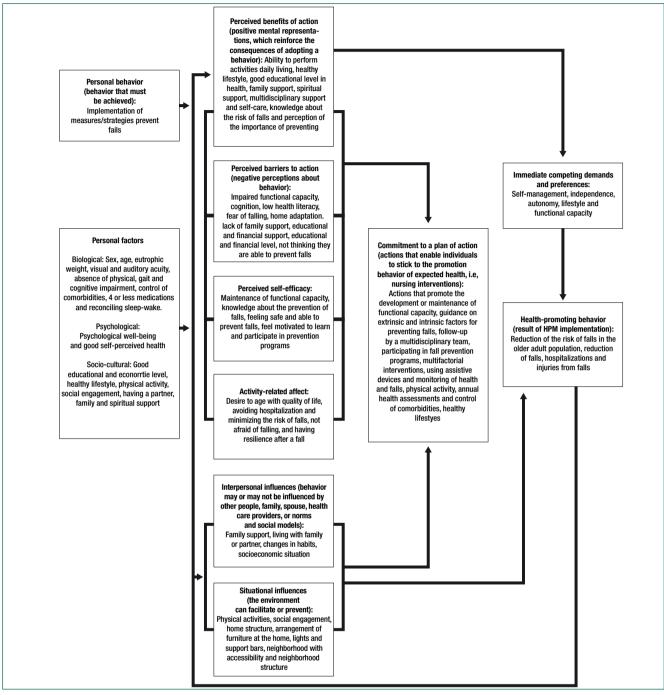
(mainly depression and anxiety), not reconciling sleep and wakefulness, sedentary lifestyle, polypharmacy, alcoholism, history of hospitalizations, injuries from falls, impairment in activities of daily and instrumental living and being single or widowed.

Behavior-specific cognitions and affect
The 40 studies showed that older adults who were aware of the risk of falls and received guidance on prevention had a lower history of occurrences of this problem. Furthermore, older adults who were not aware of the risk of falling were inattentive when walking and carrying out daily activities and, therefore, had a greater number of falls. Studies have shown that the perception of falling is related to aging and frailty. Research shows that some older adults are afraid of falling, especially after falling, restricting their daily activities, mobility and social activities, in addition to making them more dependent on caregivers. It is also noteworthy that older adults who felt safe, able to prevent falls and had good communication with professionals were less likely to fall. At home, carpets, wires from electronic equipment, domestic animals, wet bathroom floors, poor lighting, lack of support bars, stairs, improper arrangement of furniture, use of inappropri-

ate shoes are risk factors for falls. On the street and in the neighborhood, studies show bumpy and wet asphalt, uneven sidewalks, intense traffic, motorcycles and cars parked in inappropriate places and inadequate lighting as risk factors.

Behavioral outcome
In this component, 20 studies showed essential behaviors to prevent falls, such as having knowledge about factors that cause falls, having an annual medication review by a health professional, annual health status assessments, annual eye exams, exercising (perform at least 150 minutes of physical activity of moderate to vigorous intensity per week), maintain a healthy diet, supplement vitamin D daily and consume foods rich in calcium. The studies presented technologies that helped with compliance with preventive behavior, such as assistive technologies (smart homes, smart watches, computer programs, applications, elevators and hip protectors), educational technologies (personalized guidance, use of booklets, serial albums, folders, posters, images, educational games and use of three-dimensional models) and multifactorial interventions that stimulate gains in strength, mobility and balance. Figure 3 shows the fall prevention diagram.

HPM – Health Promotion Model
Source: Constructed by the authors
Figure 3. Diagram for preventing falls based on the Health Promotion Model

Discussion

It stands out as a limitation that four articles were not found in full for full reading, as they did not have abstract, authorship information or DOI number, unsuccessfully using all possibilities to rescue them.

The methodological process developed in this study enabled the integration of information and details for constructing a diagram aimed at preventing falls. The Health Promotion Model made it possible to develop a simple and clear structure on the fall prevention process, in which it was possible to

identify risk factors that can significantly contribute to the occurrence of this condition as well as behaviors that can be used for its prevention.[14]

By applying fall prevention in the diagram, it is understood to have produced an instrument capable of guiding the nursing process operationalization, enabling professionals to apply nursing actions aimed at promoting health and preventing falls. The Health Promotion Model reiterates that the success of the behavior begins with the commitment that one wants to achieve. The greater the commitment to the specific plan of action, the more likely the health-promoting behavior will act.[14]

The identification of characteristics and personal experiences can positively interfere with health promotion behaviors, by identifying risk factors that can significantly contribute to the occurrence of falls in older adults. Among the risk factors, intrinsic ones stand out, health problems that are linked to individuals, such as polypharmacy, reduced visual and adductive acuity, gait alteration, among others. Such factors reduce the functional capacity of older adults and often lead to falls.[15,16] Thus, the importance of health professionals in the care and management scope is highlighted, for the elaboration of strategies that minimize the impacts of these factors in daily life and prevent the appearance of recurrent falls.

Feelings and knowledge about desirable health behavior contain modifiable elements, depending on individuals' motivation. Studies indicate that counseling for healthy behaviors carried out by professionals can make individuals more active about their health process, reducing the incidence of falls.[17-19] Therefore, health promotion, with a focus on self-care, can help older adults to take care of themselves, positively influencing the preservation of their autonomy, independence, quality of life and, consequently, healthy aging.[20]

With regard to barriers to adopting the behavior, the consequences after a fall were observed, highlighting the fear of falling syndrome. Insecurity increases the concern of older adults to maintain balance after a fall and, therefore, fear of having an accident again. Also economic and social limitations, which have become a barrier to the adoption of preventive measures and modifications in the environment in which they fell, were highlighted.[21]

Another important factor to highlight is the individual-environment relationship. Falls at home or on the street depend on environmental stressors caused by poor home planning, lack of municipal structure and accessibility.[22] In this regard, thinking about changing behavior as oriented in the model allows the reduction of possible changes that contribute to the occurrence of the event. Thus, home assessment and guidance on changing risk factors at home should be encouraged. Health professionals should carry out educational interventions with older adults, caregivers and family, about care at home and outside it to prevent falls.[23,24] Even in the homes of older adults with lower purchasing power, without the possibility of adopting structural changes in the environment, health professionals play an essential role in providing guidance on how to provide a safe environment through the use of simple measures. Moreover, it is necessary to think about the importance of intersectoral actions aimed at minimizing the recurrence of this condition in the older adult population.[25]

Studies have shown that older adults who felt safe, able to prevent falls and had good communication with professionals were less likely to fall.[25-29] This security was given by receiving guidance and professional monitoring, supervision of caregivers, motivation and good family life. The use of auxiliary devices (canes and walkers) aroused confidence in older adults. Research has also shown that lower educational levels negatively contribute to physical health, with repercussions on quality of life and an increase in the number of falls. In this way, health professionals can significantly contribute to improving older adults' health literacy through educational work in health and health promotion.[30,31]

Thus, Pender's model emerges as a proposal to integrate nursing with behavioral science, identifying factors that influence healthy behaviors and as a guide to discover what drives, motivates or demotivates individuals to adopt such behaviors.[32]

The diagram presented in this study is shown as an instructional tool capable of guiding conduct and reveals factors and strategies for preventing falls, which require the commitment of different sectors of society (political, economic and infrastructure).

It can be used by different professionals and managers, as it allows a transversal view, with the need for intersectoral integration for its effectiveness.

The use of the diagram by Primary Health Care professionals with the older adult population is relevant, as these professionals are closer to the community, making it possible to understand the particularities of each individual and groups and being able to build a more appropriate and individualized care plan. Although the diagram was developed for older adults in the community, it can be used in other settings, such as in Nursing Homes as a way to guide professionals and older adults about biopsychosocial and behavioral factors for preventing falls.

Professionals will be able to use the elements of the model, concomitantly or separately, to understand the factors and behaviors and help older adults, family members and caregivers to promote care aimed at preventing this condition. Furthermore, this tool can be included in the construction of research instruments, in educational actions or even in the elaboration of protocols in consultations with older adults.

Diagram application aimed at preventing falls can help managers in the creation of public policies, a checklist or a guide that can be used by professionals during a gerontological consultation to identify risk factors, knowledge about the problem and monitoring the adoption of a desirable behavior. Furthermore, in nursing, professionals can apply the diagram within their nursing process, with the aim of enhancing nurses' role in identifying diagnoses, establishing results and implementing interventions aimed at promoting older adults' health.[33,34]

Conclusion

Through the integrative review, a diagram was elaborated that allowed the identification of personal factors, barriers and benefits related to health-promoting behavior for fall prevention in older adults. This construction provides nurses with a solid basis for detecting diagnoses, consolidating results and implementing interventions aimed at promoting older adults' health. With this, it is possible to further improve the practice of these professionals, benefiting older adults with well-being and quality of life.

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