EDUCATIONAL TECHNOLOGIES IN FALL PREVENTION IN HOSPITALIZED CHILDREN

Tecnologias educacionais na prevenção de queda em crianças hospitalizadas

Tecnologías educacionales en la prevención de caída en niños hospitalizados

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ABSTRACT

Objective: The study's main purpose has been to identify in both national and international literatures the educational technologies used to prevent falls of hospitalized children. **Methods:** It is an integrative literature review, which was performed in April 2018 through *LILACS*, MEDLINE and *BDENF* (via Virtual Health Library), CINAHL and PubMed, without delimiting the publication period. **Results:** Nine articles were analyzed. Most published in international journals and by registered nurses. The predominant themes were as follows: the instruments usage and effectiveness in order to identify the risk of falling of hospitalized children; the development of fall prevention programs using multifaceted strategies; and the use a web training system for patient safety. **Conclusion:** Educational technologies can be useful to facilitate the training of professionals and family members, as well as to subsidize nurses' professional practice regarding the prevention of adverse events, such as falls, then reducing their occurrence.

Descriptors: Accidental falls, hospitalized children, educational technology.

RESUMO

Objetivo: analisar os indicadores bibliométricos da produção científica disponibilizada em periódicos sobre atividade física e a prevenção de quedas em idosos. **Método:** estudo bibliométrico, com abordagem quantitativa, de base documental, constituído por 43 artigos encontrados nas bases de dados Literatura Latino Americana e do Caribe e *Medical Literature Analysis and Retrieval System Online* no período de 2007 a 2017. **Resultados**: houve predominância de estudos sobre a temática na Revista Brasileira de Geriatria e Gerontologia e na Revista Fisioterapia e Movimento; nas regiões Sul e Sudeste do Brasil; e no cenário internacional, nos Estados Unidos; do tipo original, mediante ensaios clínicos não-randomizados, com abordagem quantitativa; na área de Medicina e autores com titulação de doutor. **Considerações finais:** a produção científica acerca da temática, embora ainda incipiente na área da Educação Física, mostra a relevância da atividade física para a prevenção de quedas e do interesse crescente de gestores, pesquisadores e profissionais.

Descritores: Atividade física; Acidentes por Quedas; Promoção da Saúde Idoso.

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RESUMEN

Objetivo: analizar los indicadores bibliométrico de producción científica disponibles en publicaciones periódicas sobre actividad física y prevención de caídas en ancianos. **Método:** estudio bibliométrico, con aproximación cuantitativa, base documental, consistente en 43 artículos encontrados en las bases de datos de literatura latinoamericana y caribeña y en el sistema de análisis y recuperación de literatura médica en línea en el periodo de 2007 a 2017. **Resultados:** hubo un predominio de los estudios sobre la temática en la revista brasileña de Geriatría y Gerontología y en la revista fisioterapia y movimiento; En las regiones del sur y sureste de Brasil; Y en la escena internacional en los Estados Unidos; Del tipo original, mediante ensayos clínicos no aleatorizados, con un enfoque cuantitativo; En el área de medicina y autores con titulación doctoral. **Consideraciones finales:** la producción científica sobre el tema, aunque aún incipiente en el ámbito de la educación física, muestra la relevancia de la actividad física para la prevención de caídas y el creciente interés de directivos, investigadores y profesionales.

INTRODUCTION

The Brazilian Ministry of Health defines a fall as "the unintentional displacement of the body to a lower level than the initial position due to multifactorial circumstances that compromise stability, then either resulting or not in damage".[1] Such events might cause temporary or permanent limitations and disabilities. Hence, the prevention of falls is one of the goals of the National Patient Safety Program and an indicator of the quality of care.[2]

In the hospital setting, the fall occurs due to the patient's estrangement from the location, associated with physical, cognitive or sensory impairment resulting from diseases that predispose to falls and/or the use of medications that may increase the risk of falling, such as sedatives and diuretics.[3,4]

The outcome of falls may include fractures, intracranial hematomas, bleeding, and even deaths. In hospitalized patients, it can generate negative impacts in addition to physical and emotional sequelae to the patient, such as increased time and costs of hospital stay, as well as reduced credibility in the quality of care, anxiety in the health team, and legal and ethical repercussions for the institution.[1-3]

Falls to the ground are more frequent in old age people. Children, for instance, are more prone to falling because they often assume risky behaviors, and furniture is often not suitable for their size. Other risk factors described as significant are a history of falls, episodes of disorientation and changes in gait and mobility difficulties in general, as well as age under 36 months. It should be noted that those up to five years old are considered to be the most vulnerable.[4,5]

Falls of hospitalized children can also be related to parents' insecurity and apprehension within the hospital environment, in addition to the circumstances provided by workers in their daily practice and issues related to health institutions.[4-6]

The training of health professionals can be an instrument of promotion for a safe environment, where the health team can understand the phenomenon of falling, identifying the risk factors associated with it, and thus, minimizing or preventing them when possible.[6] Both patient and professional education has been recommended for the prevention of falls in hospitalized patients.[7]

Targeting to facilitate this educational process, several teaching devices can be used, whether in tactile, auditory, expository, dialog, printed or audiovisual formats, which are called Educational Technologies.[8] In the health area, more specifically in nursing, it has been observed trends in the production of Technologies for Technical and Higher Education with Students, Technologies for Health Education with the Community, and Technologies for Continuing Education with Professionals. These normally aim at transmitting essential information to change risky behaviors, as well as to facilitate access to information that complements or clarifies instructions previously provided.[9]

Bearing in mind the aforesaid, it is relevant to know: What educational technologies have been used to prevent falls of hospitalized children? This review focuses on educational technologies designed to prevent falls of hospitalized children; and by objective: to identify in both national and international literatures the educational technologies used to prevent falls of hospitalized children.

METHODS

It is an integrative literature review, which is aimed at gathering and summarizing the scientific knowledge already produced on the investigated topic. In other words, it allows to search, assess and summarize the available evidence for its incorporation into practice.[10]

Data collection and analysis took place in seven stages,[10] all based on the following research question: What educational technologies have been used to prevent falls of hospitalized children? Criteria for inclusion of studies: articles and/or theses that addressed educational technologies for the prevention of falls during hospitalization in the title, abstract, or subject. Criteria for exclusion of studies: double publications (same articles present in more than one database), and articles that exclusively addressed falls involving adults or elderly people.

Data analysis was performed by identifying the title, journal, authors, year, place of publication, theme (object and objectives), methodology, and conclusions. The categories have arisen from the addressed topics and conclusions from the studies. The level of evidence of the publications was also observed, in order to determine the confidence in the use of the results of each study and to strengthen the conclusions that generate the current state of knowledge of the investigated theme, from the research design.[10,11]

The searches in the databases were carried out in April 2018. In order to do so, DeCS and MeSH were chosen according to the Patient, Intervention, Comparison, and Outcome (PICO) strategy, in which: P: *"Criança hospitalizada", "Enfermagem pediátrica"*; "children, hospitalized"; I: *"Educação em Saúde", "Tecnologia Educacional"*, "educational technology", "health education; C: none; O: *"Acidentes por quedas"*," accidental falls", "accidental falls/prevention and control".
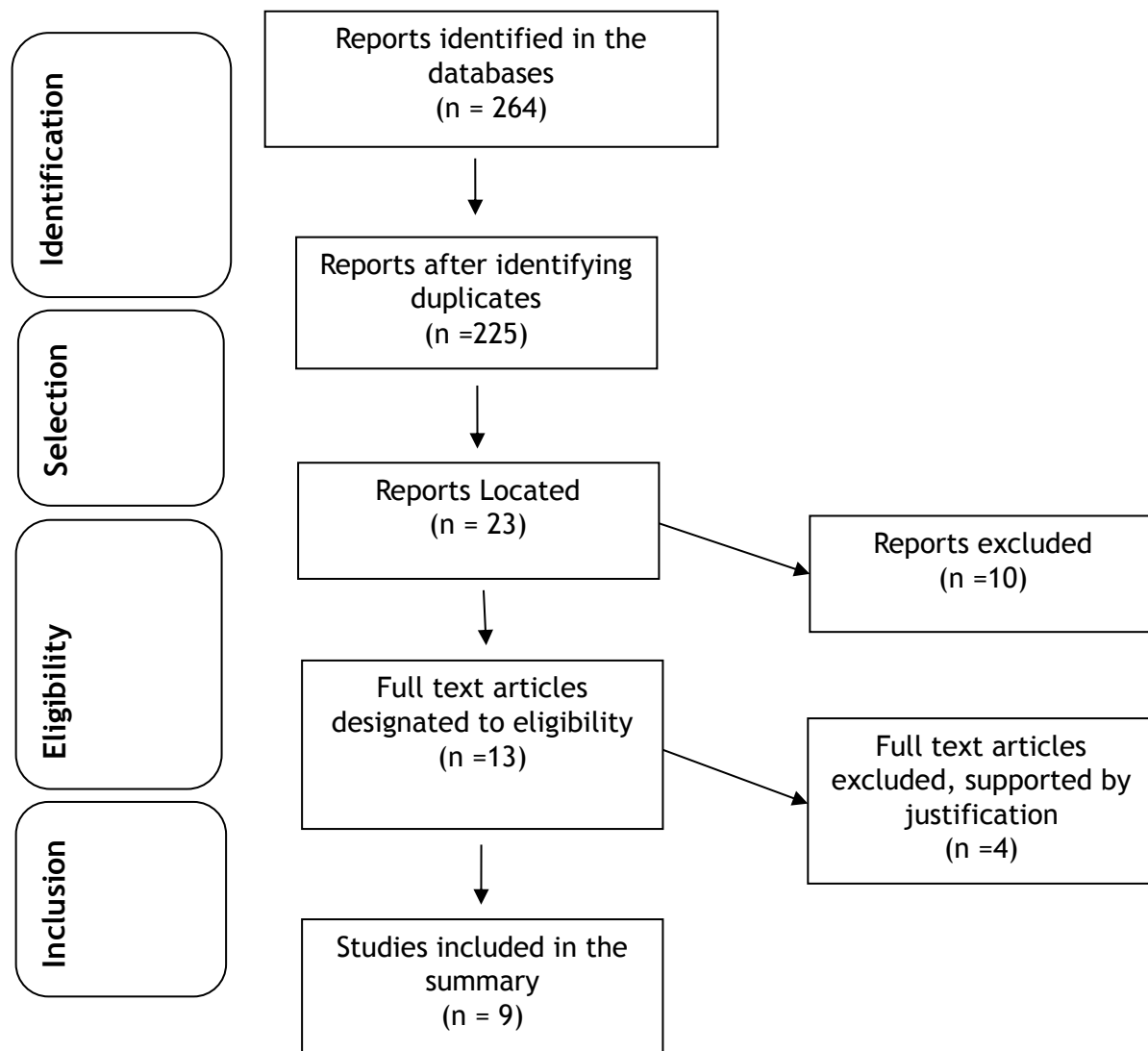
Different search strategies were used in order to allow a broad search: in the Virtual Health Library, the following

strategies were used: *Acidentes por quedas* AND *Criança hospitalizada*, *Tecnologia Educacional* OR *Educação em Saúde* AND *Acidentes por quedas* AND NOT *idoso*, and *Tecnologia Educacional* OR *Educação em Saúde* AND *Acidentes por quedas* AND *Criança hospitalizada*; in the CINAHL, MH "accidental falls" AND "child, hospitalized", MH "accidental falls" AND "child, hospitalized" AND "health education", MH "accidental falls" AND "child, hospitalized" AND "educational technology"; and in the PubMed (children, hospitalized [MeSH Terms]) AND (("accidental falls/ prevention and control" [MeSH Terms])), ("accidental falls" [MeSH Terms]) AND hospitalized child [MeSH Terms]),

("accidental falls/prevention and control") OR "accidental falls") AND "educational technology"), ("accidental falls") OR (("accidental falls/prevention and control"))) AND "health education" NOT "aged", ("Accidental falls") AND "hospitalized children") AND "educational technology"), ("accidental falls") AND "hospitalized children") AND " health education".

Based on the search strategies performed, a total of 264 articles were found. Afterwards, a thorough reading of titles and abstracts was performed, as well as the adaptation to the inclusion and exclusion criteria,[10,11] so that nine publications became part of the corpus of analysis of this review, as shown in **Figure 1**.

Figure 1 - Flowchart of the identification, screening and selection of articles addressing the educational technologies used to prevent falls of hospitalized children. *Rio de Janeiro* city, *Rio de Janeiro* State, Brazil, 2018

RESULTS

The final sample consisted of nine publications, published since 2007, all (except one) from international journals. 44.0% (four articles) comprise level of evidence II or III, obtained in individual studies with an experimental or quasi-experimental design. Another 66.0% are from descriptive studies (non-experimental) or with a qualitative approach, so, with a level of evidence IV. Nursing published 100.0% of the articles, two from the nursing management/administration area.

Aiming to extract the required information, the researcher must make use of an instrument that allows each article to be analyzed separately,[10] as a summary matrix (**Figure 2**), which is shown below.

Figure 2a- Summary matrix showing the articles addressing the category: Risk Assessment Instruments for Falls. *Rio de Janeiro* city, *Rio de Janeiro* State, Brazil, 2018

Article	Educational Technology	Main Findings
A1[12]	Humpty Dumpty Fall Scale (HDFS).	Used to identify the high risk of falling; if there is a high risk, the following pamphlet is distributed "Preventing Falls, Enhancing Safety" by the time the patient is admitted to the hospital.
A2[13]	Risk assessment instruments available for pediatric falls: Graf-PIF, CHAMPS, Cummin's Scale, Humpty Dumpty Falls Scale, I'M SAFE, CNMC instrument and Children's Hospital of Central California's instrument.	The effectiveness of the instruments was analyzed. Longer stay, blood disorders, and behavioral issues were significant predictors of the likelihood of falling. Cognitive impairment or neurological disease was not related to a greater likelihood of a risk of falling in this sample.
A3[14]	Humpty Dumpty Falls Scale (HDFS).	The number of falls did not differ significantly between those who obtained high HDFS scores and those who obtained low scores.

Figure 2b - Summary matrix showing the articles addressing the categories: Fall prevention programs and Web training system. *Rio de Janeiro* city, *Rio de Janeiro* State, Brazil, 2018

Article	Educational Technology	Main Findings
A4[15]	Fall prevention program in hospitalized patients, based on the perceptions of pediatric health professionals about patient falls.	Employees were actively engaged in developing definitions, selecting tools, and identifying the next steps for a comprehensive fall reduction program for their patients.
A5[16]	Evidence-based multidimensional and multidisciplinary fall prevention program.	There was a substantial reduction in the number of falls, through changes in the institutional safety policy, risk assessment instrument for falls, signaling of high-risk patients (wristbands, cards, and electronic flags), equipment changes and training/awareness of professionals.
A6[17]	Interventions to prevent falls in hospitalized children, such as the use of warning posters above the head of the beds and parental guidance.	The use of posters and parental guidance decreased the number of falls from bed in hospitalized children.
A7[18]	Humpty Dumpty Falls Prevention Program, after 10 years of its application.	The Program was adopted in 1,200 hospitals around the world. It has been translated into 5 languages (Spanish, French, Portuguese, Italian, and Japanese) and is used in 18 countries on 6 continents.
A8[19]	Conduct of family education to promote the safety of hospitalized children, recorded by the multiprofessional team in electronic medical records.	Guidance related to the prevention of falls was the most frequent procedure, both by the time of admission (72.2%) and during the first week of hospitalization (21.4%), through conversation or delivery of institutional folders.
A9[20]	Web training system for nursing undergraduates.	It is suggested that a simulation system based on case studies can be used to examine nurses' ability to avoid risks and train new professionals on fall prevention.

The most described technology was the use of Scales to identify the risk of falling of hospitalized children.[12-4] Three of the nine articles address the use and effectiveness of these instruments.

The development of a fall prevention program was the subject of five other studies,[15-9] describing technologies to support professionals, for the identification and prevention of falls, usually also involving the use of scales.[15-8] In this case,

preventive measures are multifaceted, taking into account that the fall covers three major themes - patient characteristics, caregiver characteristics, and environmental characteristics. The programs include education with signs, regular checking of environmental conditions such as the functionality of the grids, and the use of instruments to identify/signal the risk of falls. Two of these articles also mention the family education for the safety of pediatric patients, by using conversation or folders.

The five articles support the implementation of Fall Prevention Programs, as they represent successful cases. For instance, there has been a report of a significant decrease in the number of falls, before, during and after the implementation of the Fall Prevention Program - from 15 cases to zero.[17]

One of the articles proposes a web training system for patient safety.[20] It was suggested that this system should be used to examine nurses' ability to avoid risks.

DISCUSSION

In pediatrics, the literature points out five scales for assessing the risk of falling of hospitalized children.[12-4,18] The most popular is the Humpty Dumpty Falls Scale (HDFS), whose use has been encouraged and described in various parts of the study. world.[12-4,18] Although its sensitivity has been assessed to be 57% and its specificity 39.0%.[14]

The scales are very beneficial because, in addition to their care applicability, both their implementation and their use themselves promote instruction by professionals about the risk factors for falls. Consequently, they favor the adoption of strategies to minimize risk factors/behaviors, reducing the number of falls.[21]

Some fall prevention programs have in common the fact that they involve more than one strategy, usually combining risk identification tools with strategies for signaling patients at risk and aligning preventive actions with the organizational culture of patient safety.[15-7]

A comparative study assessed the impact of a multifaceted and multidisciplinary program on preventing falls in medical, surgical, and geriatric units at two different hospitals in Singapore. Their results demonstrated that a multifaceted strategy involving providing feedback to staff are important ingredients for successful implementation of a fall prevention program, observed through a sustained increase in nurses' knowledge and change in fall prevention practice.[22]

Another study carried out with elderly people addressing the prevention of falls based on nursing diagnoses, suggests that the combination of theory and practice and the construction of knowledge can support managers/health professionals to plan actions aimed at preventing falls of elderly people.[23] Such programs illustrate the value of evidence-based practice and the initiative of hospital managers, as well as multidisciplinary involvement.[16,22,23]

Therefore, when complementary measures aimed at the education of professionals are instituted, in addition to the implementation of scales, they are called multifaceted strategies, which in turn have even more effective results, especially when there is the participation of professionals both in the preparation and implementation of strategies.[15-9]

Similarly, educational strategies can also be aimed at family members of hospitalized children, such as the use of informational posters and folders or even the dialogue between professionals and family. Although the authors do not conceptualize this conduct with educational technology, it is a facilitating device for the education of companions and must be taken into account. The simple fact that the professional observes and intervenes at times when the child is exposed to the risk of falling in the hospital environment is recommended and effective.[17] Children playing in hospital halls and beds/cribs with lowered bars, all scenes from the pediatric routine, should be used by the health team as an opportunity for intervention and guidance to the child and his family.[19]

With technological advancement, it is natural that, increasingly, teaching-learning strategies aimed at patient safety use computational technology, the web.[24]

In adults, the use of multimedia strategies is already recommended as an effective intervention to improve preventive behavior in the face of falling threats. Accordingly, a study reports 94.3% adherence to at least one new fall prevention behavior in adult participants undergoing education based on multimedia technology, such as videos.[25] Studies are needed to demonstrate the result of this type of intervention in caregivers of hospitalized children.

Creating a mental representation with multisensory experiences, in other words, producing presentations that involve more than one or two of the senses increases the ability to remember information and, therefore, to adhere to propositions, which endorses the use of multimedia in health education, in general. Educational videos can combine information and motivation, generating better conduct in the practice of health education by professionals.[26] Despite the aforesaid, the use of videos with a view to preventing falls of hospitalized children was not described in the found articles.

Although the period of publication of the articles was not limited by the search, the first publications found are dated from 2007, with 55.5% of the studies being published in the last five years. This demonstrates that the study of the theme is, to a certain extent, recent and is still under construction, in an upward trend. Hence, the relatively low number of publications is justified and the need for further studies is emphasized, mainly in Brazil and making explicit the term Educational Technology.

CONCLUSIONS

This study presented the educational technologies aimed at preventing falls of hospitalized children described in the literature. Nine articles were identified, which underlined Fall Prevention Programs/Procedures and Instruments/Scales to identify falls-related risk factors for hospitalized children. One of the articles addressed the use of computational technology (web) to improve nurses' ability to avoid risks related to health care.

Considering the aforementioned, it is encouraged the use of instruments that can identify children at increased risk for falling, as well as prevention measures related to the patient, the environment, and the caregiver. Dialogical

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and/or visual preventive actions showed good performance, as well as guidelines that reinforced preventive attitudes in daily situations of hospitalized children. The prevention programs that were supported by health professionals during their elaboration and implementation, showed excellent outcomes. These strategies can be useful for hospital unit managers who aim to implement fall prevention measures.

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