DOI: 10.12923/pielxxiw-2025-0019

Effectiveness of non-pharmacological interventions in preventing falls in hospitalized patients: Umbrella review

Skuteczność interwencji niefarmakologicznych w zapobieganiu upadkom u pacjentów hospitalizowanych: przegląd parasolowy

Sawa Kwiatkowska[1,A-B,F], Sandra Lange[2,F-G,L], Wioletta Anna Mędrzycka-Dąbrowska[3,A,G,L], Renata Piotrkowska[4,G]

[1]Student Scientific Club of Anesthesia and Intensive Care, Medical University of Gdansk, Polska
[2]Department of Internal and Pediatric Nursing, Faculty of Health Sciences, Medical University of Gdańsk, Polska
[3]Department of Anesthesiology Nursing and Intensive Care, Medical University of Gdansk, Polska
[4]Department of Surgical Nursing, Medical University of Gdansk, Polska

CORRESPONDING AUTHOR:
Wioletta Anna Mędrzycka-Dąbrowska
Department of Anesthesiology Nursing and Intensive Care, Medical University of Gdansk
Dębinki 7, 80-227, Gdańsk, Polska
e-mail: wioletta.medrzycka@gumed.edu.pl

A – Development of the concept and methodology of the study/Opracowanie koncepcji i metodologii badań; B – Query - a review and analysis of the literature/Kwerenda – przegląd i analiza literatury przedmiotu; C – Submission of the application to the appropriate Bioethics Committee/Złożenie wniosku do właściwej Komisji Biotycznej; D – Collection of research material/Gromadzenie materiału badawczego; E – Analysis of the research material/Analiza materiału badawczego; F – Preparation of draft version of manuscript/Przygotowanie roboczej wersji artykułu; G – Critical analysis of manuscript draft version/Analiza krytyczna roboczej wersji artykułu; H – Statistical analysis of the research material/Analiza statystyczna materiału badawczego; I – Interpretation of the performed statistical analysis/Interpretacja dokonanej analizy statystycznej; K – Technical preparation of manuscript in accordance with the journal regulations/Opracowanie techniczne artykułu zgodne z regulaminem czasopisma; L – Supervision of the research and preparation of the manuscript/Nadzór nad przebiegiem badań i przygotowaniem artykułu

STRESZCZENIE

SKUTECZNOŚĆ INTERWENCJI NIEFARMAKOLOGICZNYCH W ZAPOBIEGANIU UPADKOM U PACJENTÓW HOSPITALIZOWANYCH: PRZEGLĄD PARASOLOWY

Wprowadzenie. Upadki pacjentów są niezamierzonym skutkiem hospitalizacji. Liczba udokumentowanych upadków maleje i stanowią one znaczną część zdarzeń niepożądanych zgłaszanych w szpitalach. Poprzez analizę niemodyfikowalnych i modyfikowalnych czynników ryzyka personel medyczny może przyczynić się do zmniejszenia liczby upadków u pacjentów. Badania opisują metody zapobiegania dostępne w praktyce klinicznej.
Cel pracy. Celem niniejszego badania jest przegląd narzędzi stosowanych przez personel medyczny do oceny ryzyka upadku oraz znalezienie niefarmakologicznych form interwencji, które można wdrożyć w celu zapobiegania upadkom.
Metoda. Przegląd literatury rozpoczęto w ostatnim kwartale 2023 r. Badanie obejmuje artykuły z takich baz danych jak: PubMed, OVID, Web of Science, EBSCO i Epistemonikos w języku angielskim, które spełniają kryteria PICO. W dalszej analizie uwzględniono artykuły opublikowane w latach 2019-2024. Przegląd obejmował 9 artykułów. Interwencje skutkujące zmniejszeniem liczby upadków obejmują edukację pacjentów i personelu medycznego, a także odpowiednie skale oceny ryzyka upadku. Ważne jest również dostosowanie środowiska szpitalnego do potrzeb pacjentów. Niezbędne jest również stosowanie urządzeń podtrzymujących pacjentów i sprzętu do wykrywania ryzyka upadku.
Podsumowanie. Metody zapobiegania upadkom mogą skutecznie przyczynić się do skrócenia czasu hospitalizacji. Konieczne jest kontynuowanie badań nad narzędziami służącymi do oceny ryzyka upadku, aby były one skuteczne i dostosowane do większej liczby chorób lub specyfiki niektórych oddziałów szpitalnych.

Słowa kluczowe: upadki, pacjent, zapobieganie, wykrywanie upadków

ABSTRACT

EFFECTIVENESS OF NON-PHARMACOLOGICAL INTERVENTIONS IN PREVENTING FALLS IN HOSPITALIZED PATIENTS: UMBRELLA REVIEW

Introduction. Falls in patients are an unintentional effect of hospitalisation. The number of documented falls has been decreasing and they constitute a substantial part of adverse events reported in hospitals. By analysing non-modifiable and modifiable risk factors, medical staff may contribute to the reduction of the number of falls in patients. Studies describe prevention methods available in clinical practices.
Aim. The purpose of this study is to review tools used by medical staff to assess the risk of falling and find out non-pharmacological forms of intervention to be implemented in order to prevent falls.
Method. The literature review was commenced in the last quarter of 2023. The study includes articles from such databases like: PubMed, OVID, Web of Science, EBSCO and Epistemonikos in English, which met PICO's criteria. Articles published between the years 2019-2024 were included in the further analysis.
Conclusion. Methods of preventing falls may effectively contribute to shortening the period of hospitalisation. It is necessary to continue studies on tools used to assess the fall risk in order to make them effective and adjusted to a greater number of diseases or the specific character of certain hospital wards.

Key words: prevention, falls, patient, fall detection

INTRODUCTION

Falls in patients constitute a significant risk of hospitalisation. Studies conducted in England indicate that falls in all medical centres constitute as far as 32.3% of adverse events [1]. The number of falls has been increasing with age and causes many injuries (including fatal ones) [2], which extends hospitalisation and generates additional costs [3]. The patient's profile, treatment and recovery methods have a great impact on the maintenance of their vertical position, including their balance [2]. The patient's mental state, including loneliness and social isolation, also plays an important role [4]. Many risk factors have been identified. They may be divided into modifiable and non-modifiable. Non-modifiable causes include: age, coexisting diseases, medication taken due to coexisting diseases, which cannot be modified, but are crucial for the stabilisation of the patient's condition. Modifiable risk factors include: the degree of the patient's dependence, undernourishment, environment-related hazards, style of life, the lack of movement support equipment, weight index, the lack of support from the relatives, , loneliness, depression, and other states, like poor eyesight or hearing [5,6]. Many sources refer to the positive impact of patient and medical staff education and the tailoring of the hospital environment to the hospitalised patients' needs on falls reduction.

Even those falls that do not cause an injury are likely to bring on fear, anxiety, depression and limited mobility, which has a negative impact on the patient life comfort. The most serious injuries include hip fracture and craniocerebral injuries [7]. Interventions aimed at fall prevention are broken down into: single intervention, multiple interventions, and multifactorial interventions. In the single intervention, the patient receives one type of intervention. In the multiple intervention, the patient receives the same specific combination of two or more interventions. Multifactorial interventions include an initial analysis of risk factors and a personalised intervention [8,9]. However, the studies indicate that it is necessary to combine groups of interventions rather than choose individual ones . Nevertheless, it is necessary to examine, which components and variations of components are most effective [9,10]. The studies indicate that fall prevention methods reduce the number of incidents, but there is still the need to identify effective and commonly available strategies.

AIM

The purpose of this study is to review tools used by medical staff to assess the risk of falling and to identify non-pharmacological forms of intervention to be implemented in order to prevent falls.

MATERIALS AND METHODS

Study Design

Available tools used by medical staff to assess the fall risk and find out non-pharmacological forms of intervention to be implemented in order to prevent falls were analysed by the use of umbrella review methodology.

Study questions

What are available tools to assess the fall risk in hospitalised patients? What are effective strategies to prevent falls in hospitalised patients?

Search strategies

The literature review was commenced in the last quarter of 2024, including the last search in May 2024. Two researchers systematically searched through databases, including PubMed, OVID, Web of Science, EBSCO and Epistemonikos. They used the following key words: "hospitalised patients", "hospital", "medical staff", "inhospital falls", "falls", "prevention", "education", "fall risk", separately or in combination with "AND" and "OR". The search covered reviews conducted in the latest 7 years (2017-2024). It only included studies in English.

Inclusion and exclusion criteria

Inclusion criteria were based on the PICO classification and are presented in Tab. 1.

Tab. 1. PICO criteria

PICO	Inclusion criteria	Exclusion criteria
P	• adult patients (>18), hospitalised • nurses working in hospital wards	• patients < 18, hospitalised and non-hospitalised patients • nurses working in other units
I	• non-pharmacological interventions for fall prevention fall prevention interventions • tools used to assess the risk of falling in hospitals	• the prevention of falls in other conditions • pharmacological methods
C	• patient care • without or with comparison	Not applicable
O	• the reduction of the number of falls in patients • fall assessment tools	Not applicable
S	• systematic reviews • meta-analysis	• other types of reviews

The data were collected on the basis of JBI Umbrella guidelines [11] by two independent researchers. The researchers collected the following data: the first author, a study type, search strategies (databases, types of studies and publication date). The outcome of data collection is presented in Tab. 2. All irregularities were resolved through discussion. A full agreement on articles to be incorporated into the review was reached. The data collected from articles incorporated into the review include: the first author, study year, study purpose, population, ward, interventions, results. The results are presented in Tab. 3.

Studies incorporated into the article were appraised on the basis of the JBI Critical Appraisal Tools – JBI Systematic Reviews checklist [11], as presented in Table 3. Two authorsassessed the quality of the included articles . The analysis was based on 11 questions (Q1 – Q11) and the following answers: yes, no, unclear, not applicable.

Tab. 2. Outcome of collected data

The first author	Type of study	Search strategy	Inclusion/ exclusion (reason_
Cooper K. 2021 [12]	systematic review	Database: PubMed, web of science Type of studies: review, systematic review Publication date: 2017-2024	included
Avanecean D. 2017 [13]	systematic review	Database: PubMed, EBSCO, OVID Type of studies: review, systematic review Publication date: 2017-2024	included
Mousavipour S.S. 2021 [14]	systematic review	Database: Web of Science Type of studies: review, systematic review Publication date: 2017-2024	included
Dąbkowski E. 2023 [15]	systematic review	Database: PubMed, EBSCO, OVID Type of studies: review, systematic review Publication date: 2017-2024	included
Gambaro E. 2022 [16]	systematic review and meta-analysis	Database: PubMed, EBSCO, OVID Type of studies: review, systematic review, meta-analysis Publication date: 2017-2024	included
Kafantogia K. 2017 [17]	review article	Database: Web of Science Type of studies: review, systematic review Publication date: 2017-2024	included
McConville A. 2020 [18]	systematic review	Database: PubMed, Web of Science Type of studies: review, systematic review Publication date: 2017-2024	excluded: non-hospitalised patients
Marques P. 2017 [19]	systematic review	Database: PubMed, Web of Science Type of studies: review, systematic review Publication date: 2017-2024	excluded: report
Mikos M. 2021 [20]	review	Database: PubMed, OVID Type of studies: review, systematic review Publication date: 2017-2024	excluded: report
Morris M. E. 2022 [21]	systematic review and meta-analysis	Database: PubMed, EBSCO Type of studies: review, systematic review, meta-analysis Publication date: 2017-2024	included
Schoberer D. 2022 [22]	review	Database: PubMed, EBSCO, OVID Type of studies: review, systematic review Publication date: 2017-2024	included
Ximenes M. A. M. 2021 [23]	review	Database: Web of Science, PubMed Type of studies: review, systematic review Publication date: 2017-2024	included

2.5. Appraisal of methodological quality/critical appraisal

Ethical Aspects

The consent of the bioethical commission was not needed to conduct a literature review due to the type of article.

Tab. 3. Appraisal of studies incorporated into the review based on JBI Critical Appraisal Tools - JBI Systematic Reviews checklist

Studies	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11
Cooper K. and partners / 2021 [12]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Mousavipour S.S. and partners / 2022 [14]	Y	Y	Y	Y	Y	Y	Y	Y	U	Y	U
Dabkowski E. and partners / 2023 [15]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Gambaro E. and partners / 2022 [16]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Kafantogia K. and partners / 2017 [17]	Y	Y	Y	Y	Y	Y	Y	Y	U	U	N/A
Morris M. E. / 2022 [21]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Schoberer D. / 2021 [22]	Y	Y	Y	Y	Y	Y	Y	Y	N/A	U	Y
Ximenes M. A. M. / 2021 [23]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	U
Avanecean D. and partners / 2017 [24]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Q-question; Y - yes; N - no; U - unclear; N/A – not applicable; Q1: Is the review question clearly and explicitly stated?; Q2: Were the inclusion criteria appropriate for the review question?; Q3: Was the search strategy appropriate?; Q4 Were the sources and resources used to search for studies adequate?; Q5: Were the criteria for appraising studies appropriate?;Q6: Was critical appraisal conducted by two or more reviewers independently?; Q7: Were there methods to minimize errors in data extraction?; Q8: Were the methods used to combine studies appropriate?; Q9: Was the likelihood of publication bias assessed?; Q10: Were the recommendations for policy and/or practice supported by the reported data?; Q11: Were the specific directives for new research appropriate?

RESULTS

The researchers analysed 781 articles. When duplicates were excluded, 691 articles were obtained. After the selection of titles and summaries, 12 articles remained for which the full text had to be analysed. Based on the inclusion criteria, 9 articles remained. The results are presented in Diagram 1. Four of the included articles are systematic reviews, 3 are reviews and 2 are systematic reviews combined with meta-analysis. The researchers used articles containing information about fall risk factors and assessment tools, as well as fall prevention strategies and programmes.

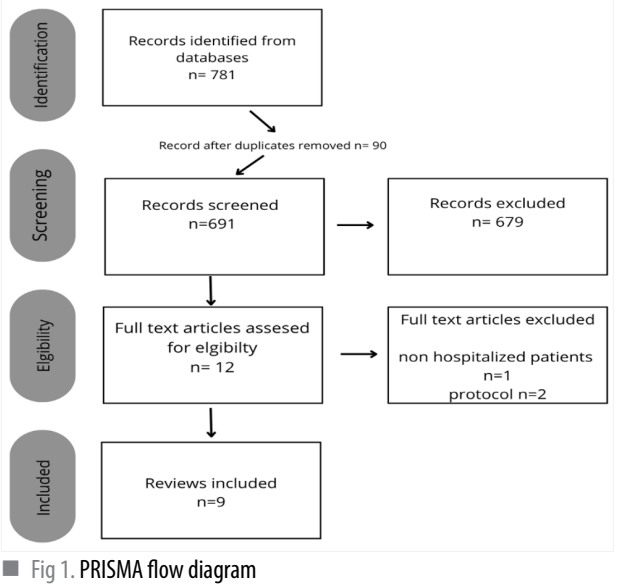

Fig 1. PRISMA flow diagram

Tab. 4. Results of the umbrella review

Author/year	Purpose of the article	Population (n)	Ward	Interventions	Results
Cooper K. / 2021 [12]	The collection of evidence about fall prevention and detection by use of technologies.	hospitalised patients (>18) n = 229	Oncology, stroke-related rehabilitation and partners	• the use of technological devices to detect falls • the use of technological devices to prevent falls (sensors, cameras and electronic devices carried by a patient)	57% of studies prove that tools reduce the number of falls effectively.
Avanecean D. / 2017 [13]	The evaluation of the effectiveness of patient-centred care in fall prevention.	hospitalised patients (>18) n=910	General medicine, urology, cardiology, neurology, oncology/haematology, gastroenterology, endocrinology, geriatrics, pulmonology, others	• the use of a patient-centred care model	• 3 out of 5 studies (60%) reflect a decrease in the number of falls in the patient-centred care model
Mousavipour S.S. / 2022 [14]	Factors reducing the number of falls in hospitalised patients.	• hospitalised patients (>18) • medical staff n=not specified	Hospital	• Educating patients, their relatives and medical staff. • Safe hospital environment (lighting, the height of a bed, appropriate footwear) • Fall detection devices (cameras, sensors, alarms)	• Educating patients and their relatives brings about positive results in decreasing the number of falls. • The patients mostly need a safe hospital environment. It is necessary to pay provide such an environment because it is crucial in fall prevention. • Fall detection devices reduce the number of injuries if medical staff are well-trained to respond to alarms.
Dabkowski E. / 2023 [15]	The appraisal of the system appraising falls in patients.	hospitalised patients (>18) n=1569	Rehabilitation, geriatrics, emergency care	• - tools used to assess the fall risk (SCI-FCS, FRPQ)	• SCI-FCS and FRPQ scales are the only scales of Class A, which indicates for the essence of their content and the consistency of appraisal
Gambaro E. / 2022 [16]	The presentation of a corelation between depression and the fall risk.	hospitalised and non-hospitalised patients (>18) n=not specified	Hospital, home	• the indication of depression symptoms as a risk factor which should be included in the risk assessment	• the identification of a relation between depression symptoms and the fall risk (OR 1.19, CI 0.86–1.64)
Kafantogia K. / 2017 [17]	The review of factors that increase the fall risk in patients.	hospitalised patients (>18) n=not specified	Hospital	• MFS and STRATIFY scales to assess the fall risk • adjusting the hospital space (barriers at beds and along corridors, easily available tools, like crutches within the patient's reach)	• the MFS scale as easy to use was mentioned by 84% of nurses • the adjustment of hospital space reduces the number of falls significantly.
Morris M. E. / 2022 [21]	The review of interventions that reduce the fall risk.	• hospitalised patients (>18) • medical staff n=not specified	Hospital	• patient and medical staff education • supporting devices • modifications in the hospital environment	• during the education process, the fall ratio decreased (0.70 [0.51–0.96] to 0.62 [0.47–0.83]) • the use of supporting devices did not contribute to a significant change in the number of falls (CI 0.84–1.78 to CI 0.94–1.31) • the modification of the hospital environment did not contribute to a significant change, either (CI 0.58–14.27)
Schoberer D. / 2021 [22]	The review of fall prevention strategies.	hospitalised patients (>18) n=not specified	hospital	• patient education	• patient education contributed to a significant decrease in the number of falls, in particular intensive education, and not a single meeting - CI [0.64, 0.99] to CI [0.57, 0.78] • educating patients with cognitive disorders does not result in decreasing the number of falls
Ximenes M. A. M. / 2021 [23]	The effectiveness of education interventions amongst patients.	hospitalised patients n=8098 (89.2%) and non-hospitalised patients (>18) total n=9078	Hospital, home, primary healthcare	• patient education by use of leaflets, movies • personalised education (including, fall risk assessment and interview)	• educating by the use of educational tools contributed to a decrease in falls (RR=0.33; 95% CI=0.096-1.13) • personalised education also contributed to a decrease in the number of falls in comparison to 0.4% (95% CI=0.2-1.1), to 1.5% (95% CI=0.9-2.6)

Key results

The summary of the results of the umbrella review is presented in Tab. 4.

Description of studies

The population consisted of 11,786 hospitalised and non-hospitalised patients in 5 articles; the other articles did not contain the data corresponding to the size of the analysed population (n=4). Articles with non-hospitalised patients were excluded due to the essence of interventions indicated therein (n=2). Articles including medical staff were also excluded (n=2). The location of studies included hospitals (n=9), as well as home and primary healthcare centres (n=2).

The studies incorporated into the review contained information about risk factors (n=2), fall risk assessment scales (n=2), and prevention methods (n=6). According to prevention methods, the majority of publications focused on patient and staff education (50%), while the rest were focused on the adjustment of the hospital environment and care model.

Risk factors

The studies conducted by Kafantogia K. et al. break down the risk factors into internal and external. Internal factors are influenced by age, gender, place of birth, balance, previous injuries suffered during falls, sudden diseases, vision defects , and nutrition disorders. In this group, as the major problem, the respondents indicate the lack of relevant documentation and interview. It may result in an inadequate assessment of fall risk. Therefore, special attention is paid to the reduction of falls by up to 60% in hospitals where the information flow is adequately communicated within the system which must be used in accordance with the procedure. External factors include: inadequately lighted rooms, corridors and bathrooms, damaged or slippery flooring, unfit footwear, and unprotected corridor with barriersor inadequate height of furniture [17]. Gambro E. et al. refer to the correlation between symptoms of depression and an increased fall risk as factors that ought to be taken into account in the fall risk assessment [16].

Fall risk assessment tools

In their review, Dabkowski E. et al. analysed available risk assessment tools and recommended two tools. Spinal Cord Injury-Functional Index (SCI-FCS), which is used in the assessment of patients with spine injuries, and Fall Risk Perception Questionnaire (FRPQ), which assesses the fall risk in emergency wards. However the FRPQ scale needs further investigations among other population, because only one study has been conducted [15]. Kafantogia K. et al. indicate 2 other tools used in the whole world. The Morse Fall Scale (MFS) as an easy and quick fall risk assessment scale and STRATIFY to identify the risk of falling in hospitalised elderly patients [17].

Fall prevention

Education

In their studies, Morris M. E. et al. indicate that patient and medical staff education influences multifactorial interventions. Such interventions also include response to patients' alerts and adequate transfer of work by nurses after their shift [21]. Schoberer D. et al. also write about a significant positive effect of patient education. The more intensive and frequent the meetings are, the better are the effects [22]. Ximenes M. A. M. et al. point out a personalised approach to the patient and general interventions like videos and leaflets, as effective patient education methods. The personalised approach involves risk assessment tools and an interview with a patient which is even more effective in improving patients' awareness of falls and patients' knowledge [23].

Care model, supporting devices and space management

Mausavipour S. S. et al. pay attention to education, exercises, physiological factors, an adequate risk assessment, fall detection tools and safe environment [14]. The study conducted by Avanecaen D. et al. refers to the essence of the patient-centred care model in intensive care units as a model that significantly reduces the number of falls during hospitalisation. This care model allows for the individual definition of fall risk factors and the choice of prevention methods for patients [13]. Cooper K. et al. point out that fall detection tools combined with the staff's vigilance can reduce the number of falls in hospitalised patients. Fall detection tools include tools that are usedby patients or not, which include cameras in patients' rooms and position detection sensors [12]. Kafantogia K. et al. pay attention that it is necessary to adjust the hospital space to hospitalised patients' needs. This includes barriers at beds and along corridors, easily available tools, like crutches within the patient's reach [17].

DISCUSSION

Falls in hospitalised patients are caused by many factors over which we have no or little influence. These are both physical and mental factors [14,16,17]. To choose relevant prevention methods, there are tools that enable us assess the risk and tools that can be used by any individual in practice [16,17]. The most effective prevention methods are patient and medical staff education, an individual approach to patients, the adjustment of hospital environment and wards to patients' safety needs, as well as the use of available technological tools [12,13,17].

Kafantogia K. et al. and partners analysed 19 publications and indicate that 78% of falls are caused by physiological factors, and unpredictable factors within that category were not taken into account in standard risk assessments. Predictable factors are another most frequent group (14%), which indicates that the majority of falls could be prevented [17]. Mausavipour S. S. et al. studied 32 articles and reported on the multidimensional aspect of patient falls, including risk factors, and underline

the significance of actions taken by an interdisciplinary team, which uses fall prevention measures in an effective way [14]. Gambaro E. et al. based their study results on 18 publications. Within these articles, 33.3% focused on a corelation between antidepressants taken by patients and the fall risk which did not show an impact that would increase the number of falls in those patients [16]. In another study, Meireles I. B. et al. refer, however, to the impact of other medications, like diuretics and benzodiazepines, in particular in elderly persons, on the lability of blood pressure, dizziness, and visual disturbances [25]. However, the analysis of 11 out of 18 publications by Gambaro E. indicated, that depression symptoms are factors that influence falls in the future. Depression and the fall risk are also corelated, but this relationship is still unclear [16]. He S. et al. also point out a relation with cognitive disturbances, like delirium, and an increased fall risk and indicate that a relevant prevention of a delirium symptom contributed to a decrease in the number of falls [26]. Gute L. et al. prove a corelation between dialysed patients and an increased fall risk, but the results are unclear. However, paying attention to those patients and implementing prevention methods reduce the fall risk [27].

In 18 articles, Dabkowski E. et al. analysed 7 fall risk assessment tools and recommended 2 with A grade: SCI -FCS and FPRQ, however the FRPQ scale needs further examination, and the SCI – FCS scale is targeted at a specific group of patients. Other 13 scaleswere graded as B and require further examination of effectiveness [15]. However, Kafantogia K. et al. underlinethe significance and effectiveness of two other scales that are used all over the world: MFS and STRATIFY, which are used in all groups of patients and are easy to use [17]. There is still a question whether [13] the scales specified by Kafantogia K. et al. are actually reflected in risk reduction, like in the study of Avanecaen D. et al. where they indicate the reduction of the risk of falls due to the patient-centred model and an individual approach to patient assessment.

The study of Schoberer D. et al. indicate that personalised patient education has a significant impact on fall reduction. The intensity of education, as well as the frequency and the extent of knowledge provided to patients, give relevant results. Group education also proved to reduce the number of falls and fear against falls, however, this is not certain and requires further studies. Education on fall prevention shows an improvement only in the case of patients without cognitive disturbances [22]. Morris M. E. et al. indicate that patient education, in the form of educational materials, has a great impact on the reduction of the number of falls. Medical staff education is also very important for prevention and the provision of relevant knowledge to patients [21]. Ximenes M. A. M. et al. analysed 12 studies to indicate effective educational interventions, which include educational materials, individual single educational sessions with patients and personalised approach, multiple educational sessions with individual patients, where the latter had the greatest impact [23].

Avanecean D. et al. write about nurses dedicated to fall assessment and prevention. They are responsible for the individual assessment of the fall risk, for which fall assessment scales must be developed, interventions adapted to the needs of patients according to their physical disabilities, cognitive disorders, visual dysfunctions, and medication. The patient environment should be adjusted to their needs and suitable footwear should be selected. The nurses also recommended physiotherapeutic sessions. This model reflects a significant decrease in the number of falls in patients and requires patient and staff education, as well as actions taken by an interdisciplinary team [13]. Kafantogia K. et al. indicate that in fall prevention, it is crucial to adapt the hospital space to patients' needs, including barriers on walls and at beds and commonly accessible movement support devices [17]. Drahota A. et al. based their studies on shock-absorbing walking surfaces made of relevant materials which do not cause serious injuries. The studies indicated, unfortunately, a low impact on fall prevention, but it is also necessary to study whether anti-skid floor or floor with uneven surface will reduce the fall risk and improve the stabilisation of patients in the vertical position [28]. Seow J. P. et al. conducted studies of a system alarming when a patient leaves their bed in Singapore. The alarm emitted a signal at 3 different frequencies: during rapid movements in the bed, when the patient moved near the edge of the bed, and when the patient left the bed. Nurses were adequatelyinstructed . The study reported a significant decrease in the number of falls in the wards. However, it emphasised the importance of relevant medical staff training [29]. Cortes O. L. et al. tested a sensor that detects the pressure on beds and chairs. Unfortunately, they indicated an increase in the number of falls because of medical staff that is not adequately trained and insufficient sensor sensitivity [30]. Ndoda K. et al. on the high effectiveness of video monitoring system installed in patients' rooms, which has a significant impact on the reduction of the number of falls and is also easy to implement in the hospital environment [31]. Hsu Y. et al. studied the use of Artificial Intelligence (AI) in the prevention of falls in hospitalised patients. They used a tool where AI predicted which patient would fall. There is a chance that this new model will be used in future to prevent falls, but it needs further studies and technological development [32].

CONCLUSIONS

The well known methods of preventing falls in hospitalised patients may effectively shorten the time of hospitalisation. There are barriers that hinder the implementation of the existing solutions. Fall detection technologies, the adequate preparation of hospital space, and the provision of movement support tools generate extra costs to healthcare units. The approach of patients and medical staff based on relevant training, the development of motivation and the delivery of knowledge also have a significant impact on fall prevention. It is necessary to continue studies on tools used to assess the fall risk in order to make them effective and adjusted to a greater number of diseases or the specific character of certain hospital wards. The prevention of falls in hospitalised patients is an essential factor for the patients' recovery and the reduction of

hospitalisation costs. It is necessary to perform further studies on that issue and to provide continuous education programmes for medical staff.

Practical implications

- Well-equipped hospital wards Organisation of the hospital space.
- Nurse education.
- Training for medical professionals should be addressed not only to personnel working with patients, but to management functions at all operating levels.
- Trainingfor nurses should include the essence of fall prevention in order to improve the employees' motivation and practical skills related to patient care, as well as to use available fall risk assessment tools.
- The patient-centred care model plays an important role and should be implemented as the leading care model.
- To prevent falls in hospitalised patients, actions must be taken by an interdisciplinary team based on a holistic approach to patients' needs.

ORCID

Sandra Lange https://orcid.org/0000-0003-0725-3652
Wioletta Mędrzycka-Dąbrowska https://orcid.org/0000-0001-8377-4893
Sawa Kwiatkowska https://orcid.org/0009-0000-9161-4718
Renata Piotrkowska https://orcid.org/0000-0001-6512-255X

REFERENCES

1. Healey F, Scobie S, Oliver D, et al. Falls in English and Welsh hospitals: a national observational study based on retrospective analysis of 12 months of patient safety incident reports. Qual Saf Health Care. 2008 ;17(6):424-430. https://doi.org/10.1136/qshc.2007.024695
2. Pierchała K, Niemczyk K. Falls – epidemiology, risk factors and prevention strategy. Polski Przegląd Otorynolaryngologiczny. 2013; 2(1):1-10. https://doi.org/10.1016/j.ppotor.2013.03.007
3. Scuffham P, Chaplin S, Legood R. Incidence and costs of unintentional falls in older people in the United Kingdom. J. Epidemiol. Community Health. 2003;57(9):740-744. https://doi.org/10.1136/jech.57.9.740
4. Bu F, Abell J, Zaninotto P, et al. A longitudinal analysis of loneliness, social isolation and falls amongst older people in England. Scientific Reports. 2020;10:20064. https://doi.org/10.1038/s41598-020-77104-z
5. Mohammed RF, Alagamy ZG, El-saidy TM. Detection of the modifiable and non-modifiable risk factors and the adverse consequences of falling among elderly people. Assiut Scientific Nursing Journal. 2021;9(24):166-178. https://dx.doi.org/10.21608/asnj.2021.63690.1135
6. Bergen G, Stevens MR, Kakara R, et al. Understanding modifiable and unmodifiable older adult fall risk factors to create effective prevention strategies. Am. J. Lifestyle Med. 2019;21;15(6):580-589. https://doi.org/10.1177/1559827619880529
7. Gill TM, Murphy TE, Gahbauer EA, et al. Association of injurious falls with disability outcomes and nursing home admissions in community-living older persons. Am. J. Epidemiol. 2013;178(3):418-425. https://doi.org/10.1093/aje/kws554
8. Deandrea S, Lucenteforte E, Bravi F, et al. Risk factors for falls in community-dwelling older people: a systematic review and meta-analysis. Epidemiology. 2010;21(5):658-668. https://doi.org/10.1097/ede.0b013e3181e89905
9. Hopewell S, Adedire O, Copsey BJ, et al. Multifactorial and multiple component interventions for preventing falls in older people living in the community. Cochrane Database Syst. Rev. 2018;23(7):12221. https://doi.org/10.1002/14651858.CD012221.pub2
10. Gillespie LD, Robertson MC, Gillespie WJ, et al. Interventions for preventing falls in older people living in the community. Cochrane Database Syst. Rev. 2012;12(9): CD007146. https://doi.org/10.1002/14651858.CD007146.pub3
11. Aromataris E, Fernandez R. Godfrey C, et al. The Joanna Briggs Institute Reviewers' Manual 2014 Methodology for JBI Umbrella Reviews; The Joanna Briggs Institute: Adelaide, Australia, 2014.
12. Cooper K, Pavlova A, Greig L, et al. Health technologies for the prevention and detection of falls in adult hospital inpatients: a scoping review. JBI Evid. Synth. 2021;19(10):2478-2658. https://doi.org/10.11124/JBIES-20-00114
13. Avanecean D, Calliste D, Contreras T, et al. Effectiveness of patient-centered interventions on falls in the acute care setting compared to usual care: a systematic review. JBI Database System Rev. Implement Rep. 2017;15(12):3006-3048. https://doi.org/10.11124/JBISRIR-2016-003331
14. Mousavipour SS, Zavareh DK, Nouri1 F, et al. Exploring effective factors in reducing the fall of hospitalized patients: a systematic review. Archives of Trauma Research. 2021; 10(3): 135. https://doi.org/10.4103/atr.atr_112_20
15. Dabkowski E, Missen K, Duncan J, et al. Falls risk perception measures in hospital: a COSMIN systematic review. J. Patient. Rep. Outcomes. 2023;267(1):58. https://doi.org/10.1186/s41687-023-00603-w
16. Gambaro E, Gramaglia C, Azzolina D, et al. The complex associations between late life depression, fear of falling and risk of falls. A systematic review and meta-analysis. Ageing Res. Rev. 2022;73:101532. https://doi.org/10.1016/j.arr.2021.101532
17. Kafantogia K, Katsafourou P, Tassiou A, et al. Falls among hospitalized patients. J. Frailty Sarcopenia Falls. 2017;2(3):53-57. https://doi.org/10.22540/JFSF-02-053
18. McConville A, Hooven K. Factors influencing the implementation of falls prevention practice in primary care. J. Am. Assoc. Nurse Pract. 2020; 33(2):108-116. https://doi.org/10.1097/JXX.0000000000000360
19. Marques P, Queirós C, Apóstolo J, et al. Effectiveness of bedrails in preventing falls among hospitalized older adults: a systematic review. JBI Database System Rev. Implement. Rep. 2017;15(10):2527-2554. https://doi.org/10.11124/JBISRIR-2017-003362
20. Mikos M, Trybulska A, Czerw A. Falls – the socio-economic and medical aspects important for developing prevention and treatment strategies. Ann. Agric. Environ. Med. 2021;28(3):391-396. https://doi.org/10.26444/aaem/122409
21. Morris ME, Webster K, Jones C, et al. Interventions to reduce falls in hospitals: a systematic review and meta-analysis. Age Ageing. 2022;51(5): afac077. https://doi.org/10.1093/ageing/afac077
22. Schoberer D, Breimaier HE, Zuschnegg J, et al. Fall prevention in hospitals and nursing homes: Clinical practice guideline. Worldviews Evid. Based Nurs. 2022;19(2):86-93. https://doi.org/10.1111/wvn.12571
23. Ximenes MAM, Brandão MGSA, de Araújo TM, et al. Effectiveness of educational interventions for fall prevention: a systematic review. Text and contex nursing. 2021;30(7): e20200558. https://doi.org/10.1590/1980-265X-TCE-2020-0558
24. Avanecean D, Calliste D, Contreras T, et al. Effectiveness of patient-centered interventions on falls in the acute care setting compared to usual care: a systematic review. JBI Database System Rev. Implement. Rep. 2017;15(12):3006-3048. https://doi.org/10.11124/JBISRIR-2016-003331
25. Meireles IB, da Silva AS, Pessanha CM, et al. Fall among hospitalized patients and the use of drugs that increase the risk. Revista de Pesquisa: Cuidado é Fundamental. 2021;13(1): 1671-1677. https://doi.org/10.9789/2175-5361.rpcfo.v13.11186
26. He S, Rolls K, Stott K, et al. Does delirium prevention reduce risk of in-patient falls among older adults? A systematic review and trial sequential meta-analysis. Australas J. Ageing. 2022;41(3):396-406. https://doi.org/10.1111/ajag.13051
27. Gute L, Zimbudzi E. Interventions to reduce falls among dialysis patients: a systematic review. BMC Nephrol. 2023;24(1):382. https://doi.org/10.1186/s12882-023-03408-7
28. Drahota A, Felix LM, Raftery J, et al. The SAFEST review: a mixed methods systematic review of shock-absorbing flooring for fall-related injury prevention. BMC Geriatr. 2022;22(1):32. https://doi.org/10.1186/s12877-021-02670-4
29. Seow JP, Chua TL, Aloweni F, et al. Effectiveness of an integrated three-mode bed exit alarm system in reducing inpatient falls within an acute care setting. Jpn. J. Nurs. Sci. 2022;19(1):12446. https://doi.org/10.1111/jjns.12446
30. Cortés OL, Piñeros H, Aya PA, et al. Systematic review and meta-analysis of clinical trials: In-hospital use of sensors for prevention of falls. Medicine (Baltimore). 2021;100(41):27467. https://doi.org/10.1097/MD.0000000000027467
31. Ndoda K, Fechner J, Wordekemper J, et al. Video monitoring for fall prevention in the hospital: current evidence and considerations. Journal of Informatics Nursing. 2019; 4(4): 30-36.
32. Hsu Y, Kao YS. Can the Electronic Health Record Predict Risk of Falls in Hospitalized Patients by Using Artificial Intelligence? A Meta-analysis. Comput. Inform. Nurs. 2023;41(7):531-538. https://doi.org/10.1097/CIN.0000000000000952

Manuscript received: 13.12.2024
Manuscript accepted: 12.01.2025

Translation: Sawa Kwiatkowska