DOI 10.18471/rbe.v33.27981

FALL RISK EVALUATION SCALES: AN INTEGRATIVE LITERATURE REVIEW

ESCALAS DE AVALIAÇÃO DE RISCO PARA QUEDA: REVISÃO INTEGRATIVA DA LITERATURA

ESCALAS DE EVALUACIÓN DE RIESGO DE CAÍDAS: REVISIÓN INTEGRATIVA DE LA LITERATURA

Daniela Andrade[1]
Ramon Antônio Oliveira[2]
Ruth Natalia Teresa Turrini[3]
Vanessa de Brito Poveda[4]

How to cite this article: Andrade D, Oliveira RA, Turrini RNT, Poveda VB. Fall risk evaluation scales: an integrative literature review. Rev baiana enferm. 2019;33:e27981.

Objective: to characterize and qualify fall risk evaluation scales validated for application in hospitalized adult patients. Method: an integrative literature review that included investigations developed with hospitalized patients 18 years old or older after consulting the LILACS, PubMed, CINAHL, and Embase databases. Results: 319 papers were found, among which nine were included in the present review. Most scales were developed between 1989 and 1999 and oriented to assess fall risk in adults and elderly people. The domains mobility (88.8%), fall history (88.8%), mental state (66.6%), incontinence (77.7%), use of medications (66.6%), and sensory deficit (55.5%) were used most often. Four scales (44.4%) showed test results for the evaluation of psychometric properties. Conclusion: the scales found in the scientific literature did not present a consensus on the domains for fall prediction and most were not submitted to evaluation of the recommended psychometric properties.

Descriptors: Accidental Falls. Nursing Assessment. Techniques, Measures, Measurement Equipment. Adult. Nursing.

Objetivo: caracterizar e qualificar escalas de avaliação de risco de quedas validadas para emprego entre pacientes adultos hospitalizados. Método: revisão integrativa da literatura que incluiu investigações desenvolvidas entre pacientes hospitalizados com idade igual ou superior a 18 anos, consultadas as bases de dados LILACS, PubMed, CINAHL e Embase. Resultados: localizou-se 319 artigos, dos quais 9 foram incluídos nesta revisão. A maioria das escalas foi criada entre os anos de 1989 e 1999, para avaliação de riscos entre adultos e idosos. Os domínios mobilidade (88,8%), história de queda (88,8%), estado mental (66,6%), incontinência (77,7%), uso de medicamentos (66,6%) e déficit sensorial (55,5%) foram mais frequentemente empregados. Quatro escalas (44,4%) apresentaram resultados de testes para avaliação de propriedades psicométricas. Conclusão: as escalas encontradas na literatura científica não apresentaram consenso entre os domínios para predição de quedas e a maioria não foi submetida à avaliação das propriedades psicométricas recomendadas.

Descritores: Acidentes por Quedas. Avaliação em Enfermagem. Técnicas, Medidas, Equipamentos de Medição. Enfermagem.

[1] Nurse. São Paulo, São Paulo, Brazil.
[2] Nurse. Master of Sciences. São Paulo, São Paulo, Brazil. oliveiraramon@yahoo.com.br
[3] Nurse. Ph.D. in Public Health. Associate professor at the Medical-Surgical Nursing Department of the Escola de Enfermagem da Universidade de São Paulo. São Paulo, São Paulo, Brazil.
[4] Nurse. Ph.D. in Nursing. Professor at the Medical-Surgical Nursing Department of the Escola de Enfermagem da Universidade de São Paulo. São Paulo, São Paulo, Brazil.

Objetivo: caracterizar y calificar escalas de evaluación de riesgo de caídas validadas para su aplicación en pacientes adultos hospitalizados. Método: Revisión integrativa de la literatura que incluyó estudios desarrollados entre pacientes hospitalizados con edad igual o mayor a 18 años, consultadas en las bases LILACS, PubMed, CINAHL y Embase. Resultados: Se obtuvieron 319 artículos, 9 de los cuales fueron incluidos en la revisión. La mayoría de las escalas fueron creadas entre 1989 y 1999, para evaluación de riesgos entre adultos y ancianos. Los dominios movilidad (88,8%), historial de caídas (88,8%), estado mental (66,6%), incontinencia (77,7%), uso de medicamentos (66,6%) y déficit sensorial (55,5%) fueron los más habitualmente empleados. Cuatro escalas (44,4%) presentaron resultados de tests para evaluación de propiedades psicométricas. Conclusión: Las escalas encontradas en la literatura científica no expresaron consenso entre los dominios para la predicción de caídas. La mayoría no fue sometida a evaluación de propiedades psicométricas recomendadas.

Descriptores: Accidentes por Caídas. Evaluación en Enfermería. Técnicas, Medidas, Equipos de Medición. Enfermería.

Introduction

Fall can be defined as the unintentional displacement of the body compared to its initial position, resulting in an event that cannot be corrected when it occurs, because of multiple factors[1].

Fall prevention is pointed out by health organizations as a priority activity, given that it is a potential problem in most hospitalized patients, regardless of the type of institution[2-3]. Falls can cause consequences ranging from an increase in morbidity to death, in addition to leading to physical and psychological damage for patients and their families and having economic implications for health institutions[4-5].

Fall risk in hospitalized patients results from a combination of intrinsic and extrinsic factors, among which age, gender, cognition, functional capacity, depression, anemia, cancer diagnosis and treatment, including chemotherapy, hormone therapy, or radiotherapy, surgery, and nutritional state stand out[6-7]. Other aspects also play a role, such as impaired mobility and gait, fall history, vesicointestinal incontinence, visual deficit, pain, and use of several types of medications, for instance opiates, anticonvulsants, antihypertensives, sedatives, laxatives, and diuretics[8].

Measures to prevent falls go through an accurate approach and require several interventions such as evaluation of patients, risk identification, and implementation of interventions and educational actions[4]. Therefore, despite the recognition that it is impossible to eliminate the fall risk, it is considered that an assertive evaluation can minimize it significantly[1], in addition to allowing the implementation of interventions suitable to the needs of each patient[9-10].

To achieve this goal, there are tools of varied configurations, such as the Morse Fall Scale[11], the St. Thomas Risk Assessment Tool[12], the Conley Scale[13], Hendrich II[14], and the Hester Davis Scale[15]. Despite these alternatives, it is important to stress that some of them were designed in the 1990s, thus in healthcare delivery settings different from those currently available[15].

Another problem is the low specificity of the existing fall risk evaluation scales, resulting from their low or moderate predictive power[16]. It is suggested that the variation in specificity and sensitivity may impact the accuracy of the tools when applied in the care practice, which makes it difficult for nurses to choose the instrument most suitable to their reality[2-3].

To prevent severe damages and even death caused by falls, it is necessary to resort to an efficient and reliable risk evaluation tool, which can identify risks early and help plan and implement interventions to prevent falls[16-17].

Given this context, fall risk evaluation tools must be easy to apply and have proper reliability and validity. However, regardless of the instrument used for this objective, the clinical evaluation of nurses can never be ignored. These professionals play an important role during the evaluation of patients and implementation of interventions that

can reduce or eliminate the risk[18-19]. Additionally, an efficient fall risk evaluation instrument may be applied by multidisciplinary teams to identify risk factors and help develop intervention plans[20]. The objective of the present integrative literature review was to characterize and qualify fall risk evaluation scales validated for use in hospitalized adult patients.

Method

During the development of the present integrative literature review, the following steps were performed: identification of the subject and drafting of the guiding question, sampling or literature search, data extraction from the included papers, study evaluation and interpretation of results, and synthesis of knowledge or presentation of the review[21].

The PICO strategy[22] was used to draft the guiding question, in which P (patient/population): hospitalized adult patients, I (intervention): scales/instruments for fall prevention, C (control): does not apply, and O (outcome): fall prevention. Consequently, the resulting guiding question was: What fall risk evaluation scales/instruments validated for use in hospitalized adult patients exist in the scientific literature?

The inclusion criterion was primary studies for validation of fall risk evaluation scales/instruments carried out with hospitalized patients 18 years old or older, published in Portuguese, English, or Spanish. Exclusion criteria were: case studies, experts' opinions, studies with qualitative design, and scales/instruments that did not describe the validation procedures.

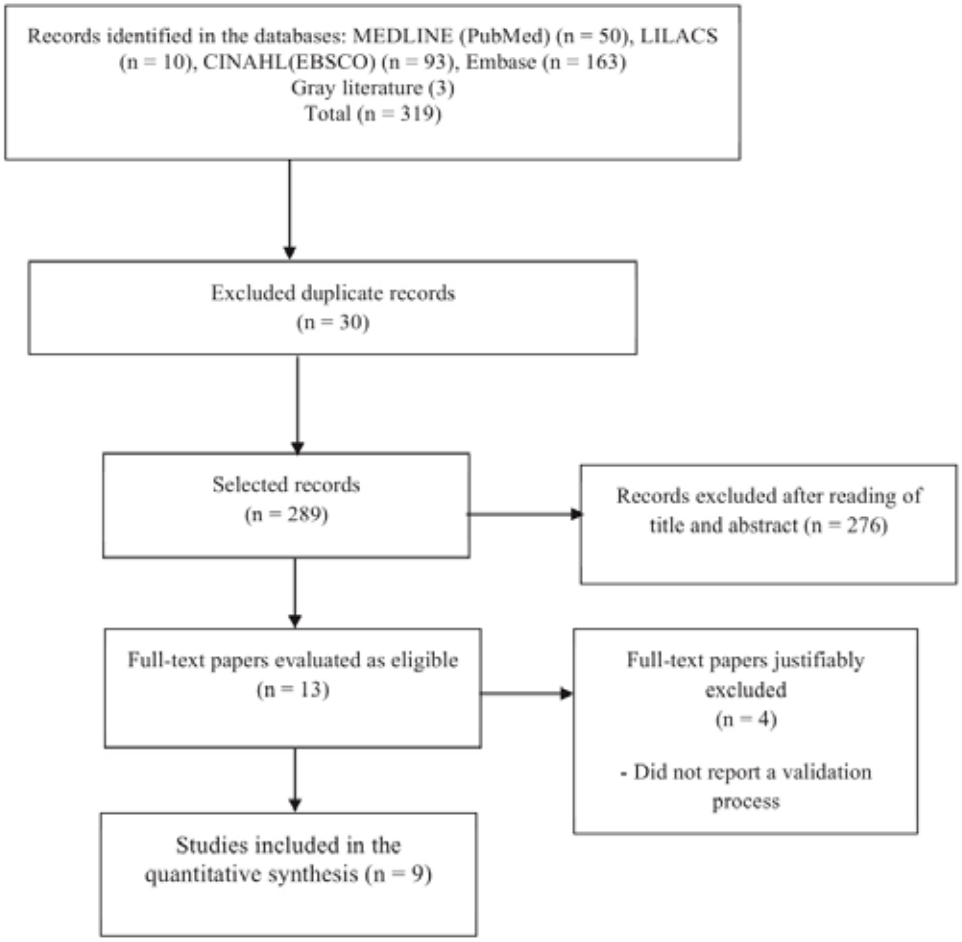
Once the guiding question and inclusion and exclusion criteria were defined, the following controlled descriptors were selected: Accidental Falls, Risk Assessment, and Nursing Assessment. They were combined as controlled and noncontrolled descriptors simultaneously using the keyword search mechanism in titles and abstracts.

The databases used to search for the studies included in the present integrative review were: Cumulative Index to Nursing and Allied Health Literature (CINAHL), Medical Literature Analysis and Retrieval System Online (Medline/PubMed), Latin America and Caribbean Center on Health Sciences Information (LILACS), and Embase. The choice of descriptors was based on terms found on the Medical Subject Headings (MeSH), CINAHL Information Systems' List of Headings, and the Virtual Health Library's Health Sciences Descriptors (DeCS, as per its acronym in Portuguese).

Paper selection was carried out by searching the databases according to the search strategies mentioned previously, taking into account different indexing dates until August 22, 2017. The search strategies for the selected databases were: PubMed: "Accidental Falls/prevention and control"[Mesh])) OR "Accidental Falls"[TiAb])) AND (("Risk Assessment/standards"[Mesh]) OR "Risk Assessment"[TiAb])) AND (("Nursing Assessment"[Mesh]) OR "Nursing Assessment"[TiAb]); CINAHL: "Accidental Falls/prevention and control"[Mesh])) OR "Accidental Falls"[TiAb])) AND (("Risk Assessment/standards"[Mesh]) OR "Risk Assessment"[TiAb])) AND (("Nursing Assessment"[Mesh]) OR "Nursing Assessment"[TiAb]); Embase: "accidental falls"/exp OR "accidental falls" AND ("risk assessment"/exp OR "risk assessment") AND ("nursing assessment"/exp OR "nursing assessment"); and LILACS: "accidental falls"/exp OR "accidental falls" AND ("risk assessment"/exp OR "risk assessment") AND ("nursing assessment"/exp OR "nursing assessment").

The search on the gray literature was performed by consulting experts in the nursing and fall prevention area and analyzing references in the publications included in the review, in addition to theses and dissertations about the subject. This part of the search resulted in the localization and inclusion of three investigations (Diagram 1).

Diagram 1 – Inclusion and exclusion of papers available in the consulted databases. São Paulo, SP, Brazil – 2017



Source: Created by the authors.

Extraction of data from the studies included in the review was carried out independently by two researchers, using an instrument that included the following data: paper identification (authors, local, publication type) and methodological characteristics (objective, sample, inclusion and exclusion criteria, data treatment, results, conclusions)[23]. The investigations were analyzed according to the COnsensus-based Standards for the Selection of Health Measurement INstruments (COSMIN)[24]. This checklist, recommended for systematic reviews on measurement properties, is made up of three steps, namely: verifying which measurement properties were evaluated, determining what the statistical method used is based on, and checking whether the study meets good methodological quality requisites[24].

Results

Nine studies met the proposed inclusion and exclusion criteria. Five (55.5%) were published in the United States of America[13-15,25-27], one (11.1%) in Canada[11], one (11.1%) in China[20], one (11.1%) in England[12], and one (11.1%) in Sweden[28]. Most (five or 55.5%) were published in the 1990s[12-13,25,27-28].

The proposed scales were developed based on adult patients who stayed at the ward of the following specialties: geriatrics (4; 44.4%)[11-12,20,28], medical-surgical ward (2; 22.2%)[13,25], clinical ward (1; 11.1%)[26], neurology (1; 11.1%)[15], and one study did not mention the specialty (11.1%)[14].

Three scales (33.3%)[11-12,14] were submitted to transcultural adaptation, and the Morse Fall Scale[11] was the most translated and adapted

(Australia, Belgium, Brazil, Canada, China, Denmark, France, Germany, Italy, Japan, Korea, Netherlands, Philippines, Portugal, Singapore, Spain, Switzerland, and United States of America). The second and third most translated and adapted scales were the Hendrick scale[14] (Brazil, Italy, Singapore, and United States of America) and the St. Thomas Risk Assessment Tool in the Falling Elderly[12] (Australia, Belgium, Canada, France, Italy, and Netherlands).

To facilitate the understanding of the results, the studies included in the present review were grouped according to publication year, application specialty, origin country, and evaluators in Chart 1.

Chart 1 – Characterization of the manuscripts included in the review according to publication year, study, scale name, origin country, application specialty, and evaluators. São Paulo, SP, Brazil – 2017

Publication year	Study/Scale name/Origin country	Specialty	Number of evaluators and their specialty
1989	Morse JM, Morse RM, Tylko S[11] Morse Fall Scale Canada	General hospital	21 evaluators. Does not describe the professional category.
1995	Hendrich AL, Bender PS, Nyhuis A[14] Hendrich Fall Risk Assessment United States of America	Clinical ward	Does not describe either the number of evaluators or the professional category.
1996	MacAvoy S, Skinner T, Hines M[25] Fall Risk Assessment Tool United States of America	Medical-surgical ward	6 managers and 1 nursing director.
1996	Nyberg L, Gustafson Y[28] Downtown Index United States of America	Geriatric ward	Does not describe either the number of evaluators or the professional category.
1997	Oliver D, Britton M, Seed P, Martin FC, Hopper AH[12] St Thomas Risk Assessment Tool in the Falling Elderly (STRATIFY) England	Geriatric ward	Does not describe either the number of evaluators or the professional category.
1999	Conley D, Schultz AA, Selvin R[13] Conley Scale United States of America	Medical-surgical ward	Care nurses.
2003	Poe SS, Cvach M, Dawson PB, Straus H, Hill E[26] Johns Hopkins Fall Assessment United States of America	Clinical ward	9 specialized nurses, 2 directors, 1 coordinator, and 1 nursing manager.
2013	Hester AL, Davis DM[15] Hester Davis Scale United States of America	Neurological ward	30 nurses. 5 experts in nursing subjects, occupational therapy, and physical therapy.
2017	Chang YW, Chang YH, Pan YL, Kao TW, Kao S[20] Tw-FRHOP China	Geriatric ward	5 clinical nurses, 5 nursing specialists, physicians, occupational therapists, and physical therapists.

Source: Created by the authors.

The domains most frequently covered by the examined scales were: mobility (8; 88.8%), fall history (8; 88.8%), mental state (6; 66.6%), incontinence (7; 77.7%), use of medications (6; 66.6%), age (3; 33.3%), intravenous devices (2; 22.2%), secondary diagnosis (3; 33.3%), sensory deficit (5; 55.5%), cognitive deficit (3; 33.3%), nutritional condition (1; 11.1%), and gender (1; 11.1%). Chart 2 shows the synthesis of the domains covered in the scales included in the present integrative review.

Chart 2 – Synthesis of the articles included in the review according to the domains evaluated. São Paulo, SP, Brazil – 2017

Scales / Domains	Age	Mental state	Mobility	Use of medications	Fall history	Devices	Incontinence	Gender	Secondary diagnosis	Sensory deficit	Cognitive
Morse Fall Scale[11]	-	X	X	-	X	X	-	-	X	-	-
Hendrich Fall Risk Assessment[14]	-	X	X	X	-	-	X	X	X	-	-
Fall Risk Assessment Tool[25]	X	X	-	X	X	-	X	-	-	X	-
Downtown Index[28]	-	X	X	X	X	-	-	-	-	X	-
St. Thomas Risk Assessment[12]	-	X	X	-	X	-	X	-	-	X	-
Conley Scale[13]	-	-	X	-	X	-	X	-	-	-	X
Johns Hopkins Fall Assessment[26]	X	-	X	X	X	X	X	-	-	-	X
Hester Davis Scale[15]	X	X	X	X	X	-	X	-	-	X	-
Tw-FRHOP[20]	-	-	X	X	X	-	X	-	X	X	X

Source: Created by the authors.

Legend: X Domain investigated; - Domain not investigated.

It was not possible to thoroughly identify the steps developed during the design and validation processes of all the scales included in the present study[11-13,15,20,25-28]. The duration of the validation processes was 4[11], 6[14], 10[15], 12[12,18,23,25], and 24 months[14]. Four studies (44.4%) did not define either the professional category or the number of evaluators involved in the validation of the scale or instrument. In the publications that mentioned this type of information, nurses stood out[11,12,14,28] as the main professional category.

Regarding the psychometric properties of the instruments included in the present review, most scales did not report the results of the statistical tests used to evaluate internal consistency, stability, construct validity, and criterion validity[12-14,25-26,28], as recommended by COSMIN[24].

However, results about stability evaluated using the intraclass correlation coefficient, with values equal to 0.90 and 0.96[11,25], and the kappa index, with values from 0.716 to 1.0[15,20], were identified in two studies. Internal consistency was expressed using the Cronbach's alpha in two studies, with values of 0.16[11] and 0.772[15]. Because of the absence of data related to the scales[12-14,25,27], it was not possible to apply the second and third steps of the evaluation proposed by COSMIN[24].

Discussion

The present integrative literature review identified nine validated scales, most of which were proposed in the 1990s[9-10,18,20-21]. It is noteworthy that, among the publications of transcultural adaptations of three scales[8-9,11-12,14], the Morse Fall Scale[11] stood out with the highest number of translations and adaptations, including into Brazilian Portuguese.

It is suggested that many health services perform the evaluation of fall risk in patients by applying a scale designed in 1989, which may have shortcomings in measuring risks to which patients are currently exposed as a consequence of the scientific and technological progress and the advances in treatments and devices used in health care that came up in this period[29].

Additionally, the scales, mostly produced in North America[13-15,25-26] and Europe[9,20], include from four to nine domains in their evaluation,

and the most common were those related to mobility[11-15,20,26,28], mental state[11-12,14-15,25-28], incontinence[12-15,20,25-26], use of analgesic and psychoactive medications[14-15,20,25-26,28], and fall history[11-13,15,20,25-26,28].

The lack of scales designed by Brazilian researchers raises concerns, because the organization of the Brazilian national health system and the variety of professional categories that make up nursing teams, to name a few factors, diverge from those of the countries where the scales were developed. This may impact on the application of the assessment and nurse care aimed at preventing falls[11]. Reaching a consensus on the domains covered in the scales is urgent, because the use of a tool that can comprehensively assess fall risk factors is an essential element to minimize the occurrence of these events, contributing to improving nursing care itself[10-11].

Regarding the measure properties examined in the scales, a variation among the studies was observed. Most investigations did not show or carry out any statistical test to evaluate the indicated psychometric properties[24]. The psychometric property mentioned most often was stability, identified in four studies, two of which[11,25] reporting intraclass correlation coefficients with values approaching 1 and two of which mentioning the kappa test, with values higher than 0.716. The application of a scale by different users indicates instrument reliability. Applying properly validated tools may help nurses in their clinical practice, resulting in greater safety in the indication of nursing care oriented to preventing falls and the associated morbidity[12].

In addition to listing the fall risk evaluation scales that may be used in the delivery of nursing care in several categories of patients as soon as the instruments' specificities are taken into account, the present integrative review emphasizes that healthcare professionals, especially nurses, can play a central role in detecting and minimizing fall risks[30]. It is also noteworthy the absence of Brazilian publications on the subject among the selected studies. It is suggested that Brazilian researchers develop scales adapted to the Brazilian healthcare delivery reality and the multiple categories of patients.

The methodological diversity adopted in the study design and validation processes was considered an important limitation in the present literature review, because it compromised the application of the COSMIN checklist[24]. To circumvent this limitation, the authors tried to extract the most information that suited the methodology chosen to evaluate the studies.

Conclusion

It was verified that most fall risk evaluation scales were proposed in the 1990s and submitted to different validation processes, developed with a focus on the evaluation of clinical or surgical patients, although there were instruments aimed at the geriatric population. The number of domains assessed by these scales was diverse, ranging from four to 11. Among them, mobility and fall history stood out, being included in most examined scales. Additionally, the low methodological quality of the selected investigations became clear, given that they did not show or were not submitted to an evaluation of all the internationally recommended psychometric properties.

Therefore, the subject is little explored at present, although its importance as an indicator of quality and safety in the care to patients continues to grow in health services.

Collaborations:

1. conception, design, analysis and interpretation of data: Daniela Andrade, Ramon Antonio Oliveira, Ruth Natalia Teresa Turrini, and Vanessa de Brito Poveda;

2. writing of the article and relevant critical review of the intellectual content: Daniela Andrade, Ramon Antonio Oliveira, and Vanessa de Brito Poveda;

3. final approval of the version to be published: Daniela Andrade, Ramon Antonio Oliveira, Ruth Natalia Teresa Turrini, and Vanessa de Brito Poveda.

Acknowledgments:

The present study was carried out with the support of the Coordination for the Improvement of Higher Education Personnel (Capes, as per its acronym in Portuguese) (Funding Code 001).

References

1. Lamb SE, Jorstad-Stein EC, Hauer K, Becker C. Development of a common outcome data set for fall injury prevention trials: the Prevention of Falls Network Europe consensus. J Am Geriatr Soc [Internet]. 2005 [cited 2018 Aug 2];53(9):1618-22. Available from: DOI: 10.1111/j.1532-5415.2005.53455.x

2. Nassar N, Helou N, Madi C. Predicting falls using two instruments (The Hendrich Fall Risk Model and the Morse Fall Scale) in an acute care setting in Lebanon. J Clin Nurs [Internet]. 2014 [cited 2018 Aug 2];23(11-2):1620-9. Available from: DOI: 10.1111/jocn.12278

3. Gray-Miceli D, Mazzia L, Crane G. Advanced practice nurse-led statewide collaborative to reduce falls in hospitals. J Nurs Care Qual [Internet]. 2017 [cited 2018 Aug 2];32(2):120-5. Available from: DOI: 10.1097/NCQ.0000000000000213

4. Ang E, Mordiffi SZ, Wong HB. Evaluating the use of a targeted multiple intervention strategy in reducing patient falls in an acute care hospital: a randomized controlled trial. J Adv Nurs [Internet]. 2011 [cited 2018 Aug 3];67(9):1894-2. Available from: DOI: 0.1111/j.1365-2648.2011.05646.x

5. Filler K, Kelly DL, Lyon D. Fall risk in adult inpatients with leukemia undergoing induction chemotherapy. Clin J Oncol Nurs [Internet]. 2011 [cited 2018 Aug 3];15(4):369-70. Available from: DOI: 10.1188/11.CJON.369-370

6. Allan-Gibbs R. Falls and hospitalized patients with cancer: a review of the literature. Clin J Oncol Nurs [Internet]. 2010 [cited 2018 Aug 3];14(6):784-92. Available from: DOI: 10.1188/10.CJON.784-92

7. Ward KL, Roach PA, Wilk C, Selden MM, Hurd J, Pike MA, et al. Staff-led innovations reduce falls in high-acuity patients. Nurs Manage [Internet]. 2015 [cited 2018 Aug 3];46(12):20-5. Available from: DOI: 10.1097/01.NUMA.0000473503.33734.be

8. Hnizdo S, Archuleta RA, Taylor B, Kim SC. Validity and reliability of the modified John Hopkins Fall Risk Assessment Tool for elderly patients in home health care. Geriatr Nurs [Internet]. 2013 [cited 2018 Aug 3];34(5):423-7. Available from: DOI: 10.1016/j.gerinurse.2013.05.011

9. Bergman K, Papendick L. Falls in the neurologic illness population. J Trauma Nurs [Internet]. 2014 [cited 2018 Sep 5];21(4):182-5. Available from: DOI: 10.1097/JTN.0000000000000060

10. Powell-Cope G, Quigley P, Besterman-Dahan K, Smith M, Stewart J, Melillo C, et al. A qualitative understanding of patient falls in inpatient mental health units. J Am Psychiatr Nurses Assoc [Internet]. 2014 [cited 2018 Sep 5];20(5):328-39. Available from: DOI: 10.1177/1078390314553269

11. Morse JM, Morse RM, Tylko SJ. Development of a scale to identify the fall-prone patient. Can J Aging [Internet]. 1989 [cited 2018 Sep 6];8(4):366-77. Available from: DOI: 10.1017/S0714980800008576

12. Oliver D, Britton M, Seed P, Martin FC, Hopper AH. Development and evaluation of evidence based risk assessment tool (STRATIFY) to predict which elderly inpatients will fall: case-control and cohort studies. BMJ [Internet]. 1997 [cited 2018 Jan 22];315(7115):1049-53. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2127684/

13. Conley D, Schultz AA, Selvin R. The challenge of predicting patients at risk for falling: development of the Conley Scale. Medsurg Nurs [Internet]. 1999 [cited 2018 Jan 2];8(6):348-54. Available from: https://www.ncbi.nlm.nih.gov/pubmed/11000772

14. Hendrich AL, Bender PS, Nyhuis A. Validation of the Hendrich II Fall Risk Model: a large concurrent case/control study of hospitalized patients. Appl Nurs Res [Internet]. 2003 [cited 2018 Jan 21];16(1):9-21. Available from: https://www.ncbi.nlm.nih.gov/pubmed/12624858

15. Hester AL, Davis DM. Validation of the Hester Davis Scale for fall risk assessment in a neurosciences population. J Neurosci Nurs [Internet]. 2013 [cited 2018 Jan 21];45(5):298-305. Available from: DOI: 10.1097/JNN.0b013e31829d8b44

16. Fielding SJ, McKay M, Hyrkas K. Testing the reliability of the Fall Risk Screening Tool in an elderly ambulatory population. J Nurs Manag [Internet]. 2013 [cited 2018 Jan 21];21(8):1008-15. Available from: DOI: 10.1111/jonm.12192

17. Quigley PA, Barnett SD, Bulat T, Friedman Y. Reducing falls and fall-related injuries in mental health: a 1-year multihospital falls collaborative. J Nurs Care Qual [Internet]. 2014 [cited 2018 Jan

21];29(1):51-9. Available from: DOI: 10.1097/01.NCQ.0000437033.67042.63

18. Swartzell KL, Fulton JS, Friesth BM. Relationship between occurrence of falls and fall-risk scores in an acute care setting using the Hendrich II fall risk model. Medsurg Nurs [Internet]. 2013 [cited 2018 Jan 20];22(3):180-7. Available from: https://www.ncbi.nlm.nih.gov/pubmed/23865279

19. Al-Khatib Y, Arnold P, Brautigam L, Chan-Domingo L, Gennello B, Jaminola E, et al. Prevention strategies to reduce falls in psychiatric settings. J Psychosoc Nurs Ment Health Serv [Internet]. 2013 [cited 2018 Mar 14];51(5):28-34. Available from: DOI: 10.3928/02793695-20130327-01

20. Chang YW, Chang YH, Pan YL, Kao TW, Kao S. Validation and reliability of Falls Risk for Hospitalized Older People (FRHOP): Taiwan version. Medicine (Baltimore) [Internet]. 2017 [cited 2018 Mar 14];96(31):e7693. Available from: DOI: 10.1097/MD.0000000000007693

21. Mendes KDS, Silveira RCCP, Galvão CM. Integrative literature review: a research method to incorporate evidence in health care and nursing. Texto Contexto Enferm [Internet]. 2008 [cited 2018 Mar 14];17(4):758-64. Available from: DOI: dx.doi.org/10.1590/S0104-07072008000400018

22. Santos CMC, Pimenta CAM, Nobre MRC. The PICO strategy for the research question construction and evidence search. Rev Latino-Am Enfermagem [Internet]. 2007 [cited 2018 Mar 14];15(3):508-11. Available from: DOI: http://dx.doi.org/10.1590/S0104-11692007000300023

23. Melnyk BM, Finout-Overholt E. Evidence-based practice in nursing & healthcare. USA: Wolters Kluwer; 2015.

24. Mokkink LB, de Vet HCW, Prinsen CAC, Patrick DL, Alonso J, Bouter LM, et al. COSMIN Risk of Bias checklist for systematic reviews of Patient-Reported Outcome Measures. Qual Life Res [Internet]. 2018 [cited 2018 Mar 14];27(5):1171-9. Available from: DOI: 10.1007/s11136-017-1765-4

25. MacAvoy S, Skinner T, Hines M. Fall risk assessment tool. Appl Nurs Res [Internet]. 1996 [cited 2018 Jan 21];9(4):213-8. Available from: https://www.ncbi.nlm.nih.gov/pubmed/8961580

26. Poe SS, Cvach M, Dawson PB, Straus H, Hill EE. The Johns Hopkins Fall Risk Assessment Tool: postimplementation evaluation. J Nurs Care Qual [Internet]. 2007 [cited 2018 Jan 21];22(4):293-8. Available from: DOI: 10.1097/01.NCQ.0000290408.74027.39

27. Hendrich A, Nyhuis A, Kippenbrock T, Soja ME. Hospital falls: development of a predictive model for clinical practice. Appl Nurs Res [Internet]. 1995 [cited 2018 Jan 12];8(3):129-39. Available from: https://www.ncbi.nlm.nih.gov/pubmed/7668855

28. Nyberg L, Gustafson Y. Using the Downton index to predict those prone to falls in stroke rehabilitation. Stroke [Internet]. 1996 [cited 2018 Jan 20];27(10):1821-4. Available from: https://www.ncbi.nlm.nih.gov/pubmed/8841338

29. Costa-Dias MJM, Ferreira PL. Fall risk assessment tools. Rev Enf Ref [Internet]. 2014 [cited 2018 Jan 18];4(2):153-61. Available from: DOI: dx.doi.org/10.12707/RIII12145

30. Chaves BJP, Oliveira JS, Diniz MMP, Falcão RMM, Souza SVO, Carvalho EAS, et al. Extrinsic factors for the risk of falls in hospitalized elderly. J Nurs UFPE Online. 2018 [cited 2018 Jan 18];12(7):1835-40. Available from: DOI: doi.org/10.5205/1981-8963-v12i7a231271p1835-1840-2018

Received: August 10, 2018

Approved: December 4, 2018

Published: March 25, 2019

The *Revista Baiana de Enfermagem* use the Creative Commons license – Attribuition -NonComercial 4.0 International.
https://creativecommons.org/licenses/by-nc/4.0/

This article is an Open Access distributed under the terms of the Creative Commons (CC BY-NC).
This license lets others remix, adapt and create upon your work to non-commercial use, and although new works must give its due credit and can not be for comercial purposes, the users do not have to license such derivative works under the same terms.