

# HOW TO EVALUATE THE RISK OF FALLS IN INSTITUTIONALIZED ELDERLY PEOPLE?

## COMO AVALIAR O RISCO DE QUEDA EM IDOSOS INSTITUCIONALIZADOS?

## ¿COMO EVALUAR LOS RIESGOS DE CAÍDAS EN PERSONAS ANCIANAS INSTITUCIONALIZADAS?

Cristina Lavareda Baixinho<sup>1</sup>  
Rafael Alves Bernardes<sup>2</sup>  
Maria Adriana Henriques<sup>3</sup>

**How to cite this article:** Baixinho CL, Bernardes RA, Henriques MA. How to evaluate the risk of falls in institutionalized elderly people? Rev baiana enferm. 2020;34:e34861.

**Objective:** to identify the instruments used to assess the risk of falls in institutionalized elderly people. **Method:** Integrative Literature Review, between April and July 2018. Following a pre-defined protocol, with predefined eligibility criteria for the 18 that composed the bibliographic sample. The aim was to answer the question "What are the assessment instruments used to determine the risk of falls in institutionalized elderly people?" **Results:** the studies use different instruments, isolated or in combination, to determine the risk of falling. Specific scales were to evaluate risk were identified (Easy-Care risk of the Falls, St. Thomas Risk Assessment Tool, Downton Scale, among others), as were scales to assess functional and mental state. **Conclusion:** the most used instruments for assessing the risk of falling in institutionalized elders are the Timed Up and Go Test and the Performance-Oriented Mobility Assessment, in association with the question "Did you fall in the last 12 months?"

**Keywords:** Accidental Falls. Aged. Nursing Assessment. Risk.

*Objetivo: identificar os instrumentos utilizados para avaliar o risco de queda em pessoas idosas institucionalizadas. Método: Revisão Integrativa da Literatura, realizada entre abril e julho de 2018, conforme protocolo pré-definido, com definição de critérios de elegibilidade para 18 estudos da amostra bibliográfica, para resposta à questão "Quais os instrumentos de avaliação usados para determinar o risco de queda em pessoas idosas institucionalizadas?" Resultados: os estudos utilizam instrumentos diferentes, isolados ou em conjugação, para determinar o risco de queda. Identificaram-se escalas específicas para avaliar o risco (Easy-Care risk of the Falls, St. Thomas Risk Assessment Tool, a Escala de Downton, entre outras), testes de avaliação funcional e testes de avaliação do estado mental. Conclusão: os instrumentos mais usados para a avaliação do risco de queda nos idosos institucionalizados são o Timed Up and Go Test e o Performance-Oriented Mobility Assessment, em associação com a pergunta "Caiu nos últimos 12 meses?"*

*Descritores: Acidentes por Quedas. Idosos. Avaliação em Enfermagem. Risco.*

*Objetivo: identificar los instrumentos utilizados para evaluar el riesgo de caídas en personas ancianas institucionalizadas. Método: revisión integrativa de la literatura, hecha entre abril y julio de 2018, según un protocolo predefinido, incluyendo la definición de criterios de elegibilidad para 18 estudios de la muestra bibliográfica,*

<sup>1</sup> Nurse. PhD in Nursing. Adjunct Professor of the Higher Education Nursing School of Lisboa. Lisboa, Portugal. crbaixinho@esel.pt. <http://orcid.org/0000-0001-7417-1732>.

<sup>2</sup> Nurse. Researcher at Health Sciences Research Unit: Nursing. Coimbra, Portugal. <http://orcid.org/0000-0003-2110-7483>.

<sup>3</sup> Nurse. PhD in Nursing. Coordinating Professor of the Higher Education Nursing School of Lisboa. Lisboa, Portugal. <http://orcid.org/0000-0003-0288-6653>.

*buscando responder a la cuestión “¿Cuáles son los instrumentos de evaluación utilizados para determinar el riesgo de caída en personas ancianas institucionalizadas?” Resultados: los estudios utilizan instrumentos diferentes, separados o agrupados, para determinar el riesgo de caída. Se identificó escalas específicas para evaluar el riesgo (Easy-Care risk of the Falls, St. Thomas Risk Assessment Tool, a Escala de Downton, entre otras), testes de evaluación funcional y testes de evaluación del estado mental. Conclusión: los instrumentos más utilizados para la evaluación del riesgo de caída entre los ancianos institucionalizados son el Timed Up and Go Test y el Performance-Oriented Mobility Assessment, asociados a la pregunta “¿He caído en los últimos 12 meses?”*

*Descriptores: Accidentes por Caídas. Anciano. Evaluación en Enfermería. Riesgo.*

## Introduction

The increase in the elderly population leads to several important management challenges related to the processes of health and disease. Falls<sup>(1-2)</sup>, common in this population, are defined as an unintended event, in which a person's initial position changes into another in the same level or in a lower one<sup>(1,3-4)</sup>.

This adverse event can lead to several complications, as hospitalizations, loss of functionality and even death<sup>(2,3,5-6)</sup>. This accident is considered a geriatric syndrome with a negative impact on the functioning of the elderly person<sup>(7)</sup>. Due to falling and/or the fear of falling, a set of interventions are imposed on the elderly, limiting their autonomy and independence for self-care<sup>(2,8-11)</sup>. The impact on functionality is high, especially after fall with fractures, which makes prevention and the rehabilitation process difficult. This phenomenon is three times more frequent in long-term institutions, compared to the community<sup>(7)</sup>.

This problem tends to worsen with population aging, since risk and prevalence increase with age. One third of 65-year-old elders fall at least once a year; among those above 85 years of age, this percentage increases to 50%<sup>(2,8)</sup>.

The identification of elderly people who have a high risk of falling is the first step to help professionals define interventions to prevent falls and injuries associated with them<sup>(7,9-11)</sup>. It is agreed that the decision of whether or not an elderly person is at risk of falling must be based on scientific evidence, in order to be able to associate the right measures, for the right people,

at the right time<sup>(7,9-11)</sup>; however, a challenge in predicting falls remains, especially with regards to recurrent ones<sup>(2,7,10-11)</sup>.

Falls, being multifactorial<sup>(9,11)</sup> and complex to determine situations, make the construction of a reliable and effective instrument, that can simultaneously be simple and quick to complete, very difficult<sup>(2,11)</sup>. The results of previous studies have discussed instruments used in Long Term Care Institutions for the Elderly (ILPI).

A literature review published in 2012 aimed to identify and analyze instruments for assessing the risk of falls in institutionalized elderly people. It identified some scales, but only the Morse scale and the St Thomas's Risk Assessment Tool (STRATIFY Tool) were validated in two or more cohorts. This study also concluded that the indicators included in most scales do not assess the risk of falls in institutionalized elderly people, since they consider only the simple question “did the elderly fall in the last 12 months?”, thus failing to achieve better results in identifying the elderly who is at risk of falling,

One of the problems of the instruments currently used is the lack of sensitivity and specificity, which can affect a correct assessment. In addition, risk assessment is greatly impaired since falls are complex and multifactorial phenomena, which can make risk assessment instruments ineffective for determining individual risk<sup>(2,11-12)</sup>.

In this context, the objective of this study is to identify the instruments used to assess the risk of falls in institutionalized elderly people.

## Method

This is a study using secondary data and the Integrative Literature Review (RIL) method. A protocol with six stages was followed: identification of the theme and selection of the hypothesis or research question; establishment of criteria for inclusion and exclusion of studies; definition of the information to be extracted; evaluation of included studies; interpretation of results; and presentation of the review/synthesized knowledge<sup>(13)</sup>.

This research was guided by the following research question, formulated according to the PI[C]O mnemonic: "What assessment instruments are used to determine the risk of falling in institutionalized elderly people?"<sup>(14)</sup>.

After defining the research question and with the purpose of narrowing the confidence intervals, to facilitate the comparison of results, the interpretation of the data and increase the precision of the results, eligibility criteria for the primary studies were: primary studies that use one or several instruments for assessing the risk of falling (alone or in combination with other questionnaires); elderly ( $\geq 65$  years) population; elderly people in the context of institutionalization; articles published in Portuguese, English, or Spanish; and articles available in full text. And the exclusion criteria were: post-fall risk assessment instruments; studies with hospitalized elderly and/or those in the community.

To increase the validity of this RIL, this study only included primary studies that unequivocally

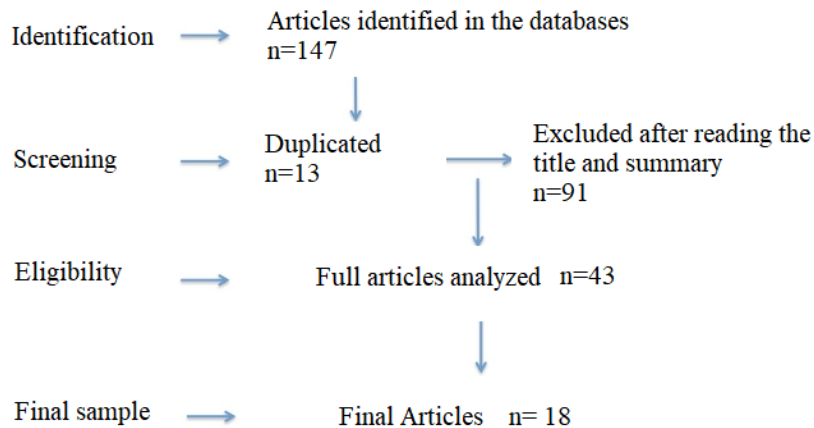
presented the objectives and the instrument(s) for assessing the risk of falling (scales, functional tests, among others) and described the fidelity and validity of the instrument, regardless of whether the studies had the purpose of evaluating the instrument itself or evaluating fall prevention programs. At least one of the variables had to be the use of the instrument and its evaluation.

The descriptors used in Portuguese, Spanish, and English, and in associations (AND/OR), were: fall risk assessment measures, fall risk assessment tool; prediction of falls risk, risk of falling; geriatric, elderly, older people; nursing home, institutionalization. The selection of the descriptors was based on the analysis of the literature carried out in the first stage of the study.

The research was carried out from April to July 2018, in the databases available on the search engines of EBSCO, B-On, SCOPUS, ISI and JBI. The period of publication established for the selection of articles was from 2013 to 2018.

The number of articles that were in accordance to eligibility criteria was 147. Reading and analyzing their titles and abstracts made it possible to immediately eliminate 13 duplicated studies. After reading and analyzing the abstracts, 43 studies were selected, and after an analysis of the full text, 18 articles were selected as the final sample. The entire selection process was based on the Prisma method (Image 1).

Studies that used adapted instruments and did not mention the changes made in the original were excluded from the sample, since it was not possible to analyze their results.

**Image 1** - Flowchart of article selection for the integrative review

Source: the authors.

## Results

The final bibliographic sample consisted of 18 primary studies (E) (Chart 1), published from 2013 to 2018 [2013 (1E); 2014 (2E); 2015 (4E); 2016 (7E); 2017 (2E); 2018 (2E)]. Although most studies were carried out in Europe (12E),

the geographical disparity was high: two are Spanish<sup>(15-16)</sup>, two Swedish<sup>(17-18)</sup>, one Belgian<sup>(8)</sup>, one Portuguese<sup>(11)</sup>, one German<sup>(19)</sup>, one Scotsman<sup>(20)</sup>, one Italian<sup>(21)</sup>, one Dutch<sup>(22)</sup>, one Serbian<sup>(23)</sup>, and one Polish<sup>(24)</sup>. The other studies were carried out in China<sup>(25)</sup>, Iran<sup>(9)</sup>, Turkey<sup>(26-27)</sup>, the Philippines<sup>(28)</sup> and Canada<sup>(29)</sup>.

**Chart 1** - Bibliographic sample with identification of the authors, year of publication, number and type of instrument for assessing the risk of falling. Lisbon, Portugal - 2018 (continued)

| Primary studies<br>(author and year of publication)                                                              | Scale for assessing<br>the risk of falling | Functional<br>evaluation | Mental status<br>evaluation | Other |
|------------------------------------------------------------------------------------------------------------------|--------------------------------------------|--------------------------|-----------------------------|-------|
| Buckinx F, Rolland Y, Reginster JY, Ricour C, Petermans J, Bruyère O. (2015) <sup>8</sup>                        |                                            | X(2)                     |                             |       |
| Sharifi F, Fakhrzadeh H, Memari A, Najafi B, Nazari N, Khoei MA, et al. (2015) <sup>9</sup>                      | X(1)*                                      | X(1)*                    | X(2)*                       |       |
| Baixinho CL, Dixe MA. (2017) <sup>11</sup>                                                                       |                                            |                          |                             | X(1)* |
| Aranda-Gallardo M, Luna-Rodriguez ME, Canca-Sanchez JC, Moya-Suarez AB, Morales-Asencio JM. (2015) <sup>15</sup> | X(2)*                                      |                          |                             |       |
| Barbosa FA, Del Pozo-Cruz B, Del Pozo-Cruz J, Alfonso-Rosa RM, Corrales BS, Rogers ME. (2016) <sup>16</sup>      |                                            | X(2)*                    |                             | X(3)* |
| Hallgren M, Herring MP, Owen N, Dunstan D, Ekblom Ö, Helgadottir D, et al. (2016) <sup>17</sup>                  | X(1)*                                      |                          | X(2)*                       | X(2)* |
| Lannering C, Ernsth Bravell M, Midlöv P, Östgren J, Mölsted S. (2016) <sup>18</sup>                              | X(1)*                                      |                          |                             | X(2)* |

**Chart 1** - Bibliographic sample with identification of the authors, year of publication, number and type of instrument for assessing the risk of falling. Lisbon, Portugal - 2018 (conclusion)

| Primary studies<br>(author and year of publication)                                                       | Scale for assessing<br>the risk of falling | Functional<br>evaluation | Mental status<br>evaluation | Other |
|-----------------------------------------------------------------------------------------------------------|--------------------------------------------|--------------------------|-----------------------------|-------|
| Gietzel M, Feldwieser F, Gövercin M, Steinhagen-Thiessen E, Marschollek M. (2014) <sup>19</sup>           | X(1)*                                      | X(4)*                    | X(1)*                       |       |
| Cooper R. (2017) <sup>20</sup>                                                                            | X(1)*                                      |                          |                             | X(1)* |
| Landi F, Dell'Aquila G, Collamati A, Martone AM, Zuliani G, Gasperini B, et al. (2014) <sup>21</sup>      |                                            |                          |                             | X(2)* |
| Vermeulen J, Neyens JC, Spreeuwenberg MD, van Rossum E, Boessen AB, Sipers W, et al. (2015) <sup>22</sup> |                                            | X(1)*                    |                             | X(2)* |
| Kocic M, Stojanovic Z, Lazovic M, Nikolic D, Zivkovic V, Milenkovic M, et al. (2016) <sup>23</sup>        |                                            | X(5)*                    |                             | X(1)* |
| Borowicz A, Zasadzka E, Gaczowska A, Gawłowska O, Pawlaczyk M. (2016) <sup>24</sup>                       |                                            | X(5)*                    | X(1)*                       |       |
| Jiang XY, Chen Y, Yang ML, Zhu XL. (2016) <sup>25</sup>                                                   |                                            |                          | X(1)*                       | X(1)* |
| Yardimci B, Aran SN, Ozkaya I, Aksoy SM, Demir T, Tezcan G, et al. (2016) <sup>26</sup>                   |                                            | X(3)*                    | X(2)*                       | X(1)* |
| Baran L, Gunes U. (2018) <sup>27</sup>                                                                    | X(3)*                                      |                          |                             |       |
| Guzman AB, Ines JLC, Inofinada NJA, Ituralde NLJ, Janolo JRE, Jerezo JL, et al. (2013) <sup>28</sup>      | X(1)*                                      | X(1)*                    |                             | X(2)* |
| Cameron EJ, Bowles SK, Marshall EG, Andrew MK. (2018) <sup>29</sup>                                       |                                            |                          | X(2)*                       | X(3)* |

Source: the authors.

X - Instrument used.

\* - Number of instruments used in the study.

The observation of Chart 1 makes it possible to determine that researchers used risk assessment instruments of different types, from scales to functional assessment tests and mental state tests, to checklists with risk factors, among others.

Only two studies determined the risk of falling using scales created exclusively for this purpose<sup>(15,27)</sup>. It was also found that six studies used the risk assessment scale in association with other instruments to determine which elderly person is more likely to fall.

The content analysis of the articles allowed to identify the scales used: the Easy-Care risk of the Falls (ECRF)<sup>(9)</sup>, the St. Thomas Risk Assessment Tool<sup>(15,19)</sup>, the Downton Scale<sup>(15,17-19)</sup>, the Falls Risk Assessment in the Elderly (FRASE)<sup>(20)</sup>, the Morse Falls Scale (MFS)<sup>(27-28)</sup>, the Fall Risk Assessment

(FRA)<sup>(27)</sup>, and the Hendrich Fall Risk Model-II (HFRM-II)<sup>(27)</sup>.

The functional assessment tests, used alone or in combination, were the Performance-Oriented Mobility Assessment (POMA)<sup>(8-9,19,24)</sup>, the Timed Up and Go Test (TUGT)<sup>(16,23-24,28)</sup>, the Berg Balance Test (BBS)<sup>(23-24)</sup>, the Barthel Scale<sup>(19,24)</sup>, the One-Legged Stance Test (OLST)<sup>(24)</sup>, and the Functional Independence Measure (FIM)<sup>(23)</sup>. These functional assessment tests are essentially focused on the evaluation of walking (capacity, quality and time) and balance (static and dynamic).

The most used instruments for assessing mental status are the Geriatric Depression Scale<sup>(9,26)</sup> and the Mini-Mental State Examination (MMSE)<sup>(17,24,26)</sup>.

Other instruments were used, such as the Falls Efficacy Scale (FES) and its variants<sup>(23,25,28)</sup>, quality of life assessments<sup>(16)</sup>, and the scale for assessing the practices and behaviors of institutionalized elderly to prevent falls<sup>(11)</sup>. These instruments helped to associate the indicators and/or the total score of risk, prevalence and/or recurrence of falls.

With the information available in the articles it was not possible to identify the average time required to fill in the instruments. The experience of the authors of this study enables them to estimate, in view of the instruments used, the average time spent in collecting data. A scale for assessing the risk of falling can range from one to several minutes, and in association with functional assessment tests it can take more time to be performed by the elderly. In some studies, the time to determine the risk of falling may have reached 90 minutes<sup>(2)</sup>.

## Discussion

After analyzing the results, it is possible to identify several instruments for assessing the risk of falls in institutionalized elderly people. In general, the most used type of instrument are risk assessment scales, functional assessment tests, mental status assessment instruments, and quality of life assessments. However, the study type is also diverse, as well as the measurement parameters, and only in some of them the psychometric properties of the instruments was evaluated.

The heterogeneity of the studies is also manifested in the differences in the age of each study's sample, since some assess the risk and functionality in 65 years or older elders<sup>(11,26)</sup>, while others analyze people above 80 years of age<sup>(16)</sup>.

The fall risk assessment scales used were not built specifically for the institutionalized elderly population, although they are often used to assess the risk of falling in this population. The lack of data in the methodology and in the results of the studies does not allow to clarify whether the authors validated the scales, or whether

they used the version of the scales validated for institutionalized elders.

The scales used were elaborated and validated for different contexts, especially the hospital environment. A recent study, which aimed to assess the psychometric properties of some scales for the institutionalized elderly population, concluded that the FRA has a strong sensitivity, the MFS has a good specificity, and states that HFRM-II should not be used to determine the risk of falling in patients in long permanence institutions<sup>(27)</sup>. The ECRF shows a predictive value for the occurrence of falls in the six months following institutionalization of residents of institutions for elderly people<sup>(9)</sup>.

A survey that evaluated the characteristics of 4 scales, commonly used in Australian ILPI, found that 40% of the items of the scales do not assess the risk of falls in institutionalized elderly<sup>(30)</sup>. In the STRATIFY Tool, 3 of the 5 items are not predictive of falls, which is also true for 7 of the 13 items in the Downton scale (used in many studies about falls in ILPI) in regards of institutionalized elderly<sup>(2,12, 30)</sup>.

Many of the assessment instruments lack sensitivity and specificity, thus classifying people above or below the real risk of falling<sup>(2,12)</sup>. Risk assessment instruments lack specificity in relation to individual risk factors, and end up identifying false predictive results, either under or overvaluing the risk, not allowing their results to be considered acceptable due to the possibility of error<sup>(30)</sup>. When an elderly person is identified with a high risk of falling, the “when”, “where” and “why” of this result is not explicit, nor is it possible to identify them through the instrument used. The instruments that assess the risk of falling will only be useful if they allow the identification of their determinants, so that actions that minimize it and reduce the risk can be implemented<sup>(2,5,7)</sup>.

Risk assessment is prejudiced by the difficulties in distinguishing risk from consequence. There are cases in which the determinant of a fall changes due to the event itself. Depressive symptoms, for example, may be a risk factor, but after the fall, they may become a consequence<sup>(2,30)</sup>.



It is agreed that the first assessment should be carried out in the first 24 to 48 hours after admission to an ILPI and whenever a fall episode occurs<sup>(2,6,18,31)</sup>. The evidence shows that there are differences in the interpretation, completion and the time of application of the instruments<sup>(18)</sup>. This conditions the interpretation of the assessment and makes it difficult to compare the results of different studies and to draw conclusions that allow extrapolations of the studies. From the studies included in this review, it was not possible to determine when the risk evaluation happened.

For the evaluation of functionality, a great diversity in the instruments used was also found. The American Society of Geriatrics and the NICE Guidelines<sup>(2,31)</sup> recommend the use of TUGT as a simple tool to identify balance alterations. Studies have shown that this test can distinguish between the elders who fall and those who do not, and that a delay greater than 12.6 seconds to perform the test reveals functional difficulties in walking and/or balance, and thus, an increased risk of falling<sup>(32)</sup>.

A study carried out in the community, using three questions: "Did you fall in the last 6 months?", "Do you think you can fall in the coming months?", and "How likely are you to fall in the coming months?", concluded that the self-assessment of the risk of falling has a strong predictive value for the incidence of subsequent falls. The question about the occurrence of falls in the last 6 months showed a good validity for the occurrence of multiple falls in the period of one year<sup>(33)</sup>.

In this review, seven studies used one or two instruments to assess mental status<sup>(9,17,19,24-26,29)</sup>. These instruments can be predictors of the risk of falling and even for that of the severity of the resulting injuries, given that there is an association between increased risk and mental status. The risk of falling increases 5% at each point lost in the MMSE, which justifies the introduction of interventions to prevent the cognitive decline of those who have an MMSE result below 24 points<sup>(2,34)</sup>.

The use of multiple instruments can jeopardize their use in clinical practice, due to a high average in data collection time. Risk assessment should be a brief and simple process,

which allows identifying who is not at risk of falling and those with a low or high risk. This assessment is more complex and difficult in an ILPI than in hospitals<sup>(2,12,30-31)</sup>.

Despite the recommendations for assessing the risk of falling in institutions for the elderly, this is not a common practice. The results of a research with ILPI professional teams concluded that the professionals are familiar with the geriatric assessment instruments, but consider that, from the point of view of preventive care, its use is not appropriate to the reality of the residents<sup>(18)</sup>. Thus, the underestimation of instruments aimed at prevention can contribute to their improper or non-existent use.

In this context, an educational intervention in the team is essential to promote an adequate management of the risk of falling and a rigorous risk assessment, using validated instruments<sup>(35)</sup>. Team intervention should follow the five domains of Team Strategies & Tools to Enhance Performance and Patient Safety (TeamSTEPPS®): team formation, communication, leadership, monitoring and mutual support<sup>(35)</sup>.

In Portugal, no studies have been identified that have validated instruments for assessing the risk of falls in institutionalized elderly people. The use of non-specific instruments for this population does not allow the assessment of the risk of falls.

An integrative review of recent literature on instruments for assessing the risk of falls in hospitalized adult persons highlighted the need for special attention to scales produced for the specificity of contexts/populations. The authors illustrate their concern with aspects related to the organization of the national health system, the diversity of professional categories that compose the nursing team, that differ from the countries in which the scales were developed, stating that this can impact the way nursing assessment and care are applied to prevent falls<sup>(36)</sup>.

Another aspect that may have an influence is the moment of the first risk assessment after institutionalization, because there is an increased risk of falling in the first five days after admission to the ILPI<sup>(37)</sup>. It should be noted that none of the instruments identified takes this risk factor into

account, which can make it difficult to determine the risk in the first days in the institution.

Like the scales used in hospitals, it was observed that the main indexes are related to mobility, mental status, incontinence, polymedication, and a previous history of falls<sup>(9,15,17,19-20,27-28,36-37)</sup>.

The limitations of this study are the heterogeneity of the instruments for assessing the risk of falling and the different samples of the studies. The research included studies in Portuguese, Spanish, and English, not identifying studies published in other languages, and gray literature was excluded. Thus, dissertations and theses using and/or validating instruments for the context being studied may have been lost.

## Conclusion

This study made it possible to conclude that most of the studies found assess the risk of falling, using at least two assessment instruments.

Of the 18 studies in the bibliographic sample, it was possible to conclude that the most used instruments to assess the risk of falling in ILPI were the Easy-Care risk of the Falls, the St. Thomas Risk Assessment Tool, the Downton scale, the Falls Risk Assessment in the Elderly, the Morse Falls Scale, the Fall Risk Assessment, and the Hendrich Fall Risk Model-II. The Performance-Oriented Mobility Assessment, the Timed Up and Go Test, the Berg Balance Test, the Barthel scale, the One-Legged Stance Test, and the Functional Independence Measure were used as functional assessment tests.

The most used instruments for assessing the risk of falling in institutionalized elderly are the TUGT and POMA. In addition, the MMSE allows the identification of elderly people with cognitive decline, and the association of this data with the risk of falling.

The question “Did you fall in the last 12 months?” has a strong predictive value for the occurrence of new episodes.

For future researches, it is essential to create and validate scales for assessing the risk of falls that are specific to the context of the ILPI.

## Collaborations

1 – conception, design, analysis and interpretation of data: Cristina Lavareda Baixinho and Rafael Alves Bernardes;

2 – writing of the article and relevant critical review of intellectual content: Cristina Lavareda Baixinho, Rafael Alves Bernardes and Maria Adriana Henriques;

3 – final approval of the version to be published: Cristina Lavareda Baixinho, Rafael Alves Bernardes and Maria Adriana Henriques.

## References

1. Alshammari SA, Alhassan AM, Aldawsai MA, Bazuhair FO, Alotaibi FK, Aldakhil AA, et al. Falls among elderly and its relation with their Health problems and surrounding environmental factors in Riyadh. *J Family Community Med.* 2018 Jan-Apr;25(1):29-34. DOI: 10.4103/jfcm.JFCM\_48\_17
2. Bernardes R, Baixinho CL, Henriques MA. Instrumentos de avaliação do risco de queda em idosos institucionalizados–Revisão Integrativa da Literatura. In: Costa AP, Sá SO, Castro P, Souza DN, editores. *Congresso Ibero-Americano em Investigação Qualitativa*, 8, 2019, Lisboa, Portugal. Atas. Oliveira de Azeméis: Ludomedia; 2019, p. 1487-96 [cited 2019 Mar 5]. Available from: <https://proceedings.ciaiq.org/index.php/CIAIQ2019/article/view/2333/2245>
3. World Health Organization. WHO Global report on falls prevention in older age [Internet]. Geneva; 2008 [cited 2019 Mar 5]. Available from: <https://scholar.google.com/r?q=World+Health+Organization.+Ageing,+Life+Course+Unit.+WHO+Global+Report+on+Falls+Prevention+in+Older+Age+Geneva+World+Health+Organization+2008>
4. Gasparotto LPR, Falsarella GR, Coimbra AMV. Falls in elderly: basics concepts and updates of research in health. *Rev Bras Geriatr Gerontol* [Internet]. 2014 [cited 2019 Apr 12];17(1):201-19. Available from: <http://www.scielo.br/pdf/rbagg/v17n1/1809-9823-rbagg-17-01-00201.pdf>
5. Bilik O, Damar HT, Karayurt O. Fall behaviors and risk factors among elderly patients with hip fractures. *Acta paul enferm.* 2017;30(4):420-7. DOI: <https://doi.org/10.1590/1982-0194201700062>



6. Centers for Disease Control and Prevention. Important Facts about Falls [Internet]. Atlanta; 2016 [cited 2019 Nov 2]. Available from: <https://www.cdc.gov/HomeandRecreationalSafety/Falls/adultfalls.html>
7. Walker GM, Armstrong S, Gordon AL, Gladman J, Robertson K, Ward M, et al. The Falls In Care Home study: a feasibility randomized controlled trial of the use of a risk assessment and decision support tool to prevent falls in care homes. *Clin Rehabil*. 2016 Oct;30(10):972-83. DOI: 10.1177/0269215515604672
8. Buckinx F, Rolland Y, Reginster JY, Ricour C, Petermans J, Bruyère O. Burden of frailty in the elderly population: perspectives for a public health challenge. *Arch Public Health*. 2015 Apr 10;73(1):19. DOI:10.1186/s13690-015-0068-x
9. Sharifi F, Fakhrzadeh H, Memari A, Najafi B, Nazari N, Khoei MA, et al. Predicting risk of the fall among aged adult residents of a nursing home. *Arch Gerontol Geriatr*. 2015 Sep-Oct;61(2):124-30. DOI: 10.1016/j.archger.2015.06.014
10. Davis DH, Muniz-Terrera G, Keage HA, Stephan BC, Fleming J, Ince PG, et al. Association of Delirium With Cognitive Decline in Late Life: A Neuropathologic Study of 3 Population-Based Cohort Studies. *JAMA Psychiatry*. 2017 Mar 1;74(3):244-51. DOI: 10.1001/jamapsychiatry.2016.3423
11. Baixinho CL, Dixe MA. ¿Cuáles son las prácticas y comportamientos de los mayores institucionalizados para prevenir las caídas? *Index Enferm* [Internet]. 2017 Dec [cited 2019 Nov 23];26(4):255-9. Available from: [http://scielo.isciii.es/scielo.php?script=sci\\_arttext&pid=S1132-12962017000300004](http://scielo.isciii.es/scielo.php?script=sci_arttext&pid=S1132-12962017000300004)
12. Baixinho CL, Dixe MA. Instrumentos de Avaliação do Risco de Queda na População Idosa—Revisão Sistemática de Literatura. *Int J Develop Educ Psych*. 2012;1(4):383-91.
13. Mendes KDS, Silveira RCCP, Galvão CM. Revisão integrativa: método de pesquisa para a incorporação de evidências na saúde e na enfermagem. *Texto Contexto Enferm*. 2008;17(4):758-64. DOI: <http://dx.doi.org/10.1590/S0104-07072008000400018>
14. Centre for Reviews and Dissemination. Systematic Reviews: CRD's guidance for undertaking reviews in health care [Internet]. York: University of York; 2009 [cited 2019 Mar 10]. Available from: [https://www.york.ac.uk/media/crd/Systematic\\_Reviews.pdf](https://www.york.ac.uk/media/crd/Systematic_Reviews.pdf)
15. Aranda-Gallardo M, Luna-Rodriguez ME, Canca-Sanchez JC, Moya-Suarez AB, Morales-Asencio JM. Validation of the STRATIFY falls risk-assessment tool for acute-care hospital patients and nursing home residents: study protocol. *J Adv Nurs*. 2015 Aug;71(8):1948-57. DOI: 10.1111/jan.12651
16. Barbosa FA, Del Pozo-Cruz B, Del Pozo-Cruz J, Alfonso-Rosa RM, Corrales BS, Rogers ME. Factors Associated with the Risk of Falls of Nursing Home Residents Aged 80 or Older. *Rehabil Nurs*. 2016 Jan-Feb;41(1):16-25. DOI: 10.1002/rnj.229
17. Hallgren M, Herring MP, Owen N, Dunstan D, Ekblom Ö, Helgadottir D, et al. Exercise, Physical Activity, and Sedentary Behavior in the Treatment of Depression: Broadening the Scientific Perspectives and Clinical Opportunities. *Front Psychiatry*. 2016 Mar;7:36. DOI:10.3389/fpsy.2016.00036
18. Lannering C, Ernsth Bravell M, Midlöv P, Östgren CJ, Mölstedt S. Factors related to falls, weight-loss and pressure ulcers—more insight in risk assessment among nursing home residents. *J Clin Nurs*. 2016 Apr;25(7-8):940-50. DOI: 10.1111/jocn.13154
19. Gietzel M, Feldwieser F, Gövercin M, Steinhagen-Thiessen E, Marschollek M. A prospective field study for sensor-based identification of fall risk in older people with dementia. *Inform Health Soc Care*. 2014 Sep-Dec;39(3-4):249-61. DOI: 10.3109/17538157.2014.931851
20. Cooper R. Reducing falls in a care home. *BMJ Open Quality*. 2017 Mar;6(1):u214186.w5626. DOI:10.1136/bmjquality.u214186.w5626
21. Landi F, Dell'Aquila G, Collamati A, Martone AM, Zuliani G, Gasperini B, et al. Anticholinergic drug use and negative outcomes among the frail elderly population living in a nursing home. *J Am Med Dir Assoc*. 2014 Nov;15(11):825-9. DOI: 10.1016/j.jamda.2014.08.002
22. Vermeulen J, Neyens JC, Spreeuwenberg MD, van Rossum E, Boessen AB, Sipers W, et al. The relationship between balance measured with a modified bathroom scale and falls and disability in older adults: a 6-month follow-up study. *J Med Internet Res*. 2015 May;17(5):e131. DOI: 10.2196/jmir.3802
23. Kocic M, Stojanovic Z, Lazovic M, Nikolic D, Zivkovic V, Milenkovic M, et al. Relationship between fear of falling and functional status in nursing home residents aged older than 65 years. *Geriatr Gerontol Int*. 2017 Oct;17(10):1470-6. DOI:10.1111/ggi.12897
24. Borowicz A, Zasadzka E, Gaczowska A, Gawłowska O, Pawlaczyk M. Assessing gait and

- balance impairment in elderly residents of nursing homes. *J Phys Ther Sci*. 2016 Sep;28(9):2486-90. DOI: 10.1589/jpts.28.2486
25. Jiang XY, Chen Y, Yang ML, Zhu XL. Predictors of Falls Efficacy Scale responses among nursing home residents in China. *Int J Nurs Sciences*. 2016 Mar;3(1):24-8. DOI: <https://doi.org/10.1016/j.ijnss.2016.02.012>
  26. Yardimci B, Aran SN, Ozkaya I, Aksoy SM, Demir T, Tezcan G, et al. The role of geriatric assessment tests and anthropometric measurements in identifying the risk of falls in elderly nursing home residents. *Saudi Med J*. 2016 Oct;37(10):1101-8. DOI: 10.15537/smj.2016.10.15205
  27. Baran L, Gunes U. Predictive Validity of Three Fall Risk Assessment Tools in Nursing Home Residents in Turkey: A Comparison of the Psychometric Properties. *Int J Car Scienc* [Internet]. 2018 Jan-Apr [cited 2019 Apr 21];11(1):36-44. Available from: [http://www.internationaljournalofcaringsciences.org/docs/5\\_baran\\_original\\_11\\_1.pdf](http://www.internationaljournalofcaringsciences.org/docs/5_baran_original_11_1.pdf)
  28. Guzman AB, Ines JLC, Inofinada NJA, Ituralde NIJ, Janolo JRE, Jerezo JL, et al. Nutrition, Balance and Fear of Falling as Predictors of Risk for Falls Among Filipino Elderly in Nursing Homes: A Structural Equation Model (SEM). *Educ Gerontology*. 2013 Apr;39(6):441-53. DOI: 10.1080/03601277.2012.661337
  29. Cameron EJ, Bowles SK, Marshall EG, Andrew MK. Falls and long-term care: a report from the care by design observational cohort study. *BMC Fam Pract*. 2018 May;19(1):73. DOI:10.1186/s12875-018-0741-6
  30. Barker AL, Nitz JC, Choy NLL, Haines T. Measuring fall risk and predicting who will fall: clinimetric properties of four fall risk assessment tools for residential aged care. *J Gerontol A Biol Sci Med*. 2009 Aug;64(8):916-24. DOI: 10.1093/gerona/glp041
  31. National Institute for Health and Care Excellence. Assessment and prevention of falls in older people [Internet]. Manchester: NICE; 2013 Jun [cited 2019 Nov 23]. Available from: <https://www.nice.org.uk/guidance/cg161/evidence/falls-full-guidance-190033741>
  32. Kojima G, Masud T, Kendrick D, Morris R, Gawler S, Treml J, et al. Does the timed up and go test predict future falls among British community-dwelling older people? Prospective cohort study nested within a randomised controlled trial. *BMC Geriatr*. 2015 Apr 3;15:38. DOI: 10.1186/s12877-015-0039-7
  33. Rodríguez-Molinero A, Galvez-Barrón C, Narvaiza L, Miñarro A, Ruiz J, Valldosera E, et al. A two-question tool to assess the risk of repeated falls in the elderly. *PLoS ONE*. 2017 May;12(5):e0176703. DOI: <https://doi.org/10.1371/journal.pone.0176703>
  34. Whitney J, Close JCT, Lord SR, Jackson SHD. Identification of high risk fallers among older people living in residential care facilities: a simple screen based on easily collectable measures. *Arch Gerontol Geriatr*. 2012 Nov-Dec;55(3):690-5. DOI: 10.1016/j.archger.2012.05.010
  35. Cunha LFC, Baixinho CL, Henriques MA. Preventing falls in hospitalized elderly: design and validation of a team intervention. *Rev esc enferm USP*. 2019;53:e3479. DOI: <http://dx.doi.org/10.1590/S1980-220X2018031803479>
  36. Andrade D, Oliveira RA, Turrini RNT, Poveda VB. Fall risk evaluation scales: an integrative literature review. *Rev baiana enferm*. 2019;33:e27981. DOI:10.18471/rbe.v33.27981
  37. Baixinho CRSL, Dixe MACR, Henriques MAP. Queda nas Instituições de Longa Permanência para Idosos: validação de protocolo. *Rev Bras Enferm*. 2017 Aug;70(4):740-6. DOI: <http://dx.doi.org/10.1590/0034-7167-2017-0109>

Received: December 13, 2019.

Approved: March 2, 2020.

Published: April 9, 2020



A *Revista Baiana de Enfermagem* utiliza a Licença Creative Commons - Atribuição-NãoComercial 4.0 Internacional.

<https://creativecommons.org/licenses/by-nc/4.0/>

Este artigo é de acesso aberto distribuído sob os termos da Licença Creative Commons (CC BY-NC).

Esta licença permite que outros remixem, adaptem e criem a partir do seu trabalho para fins não comerciais. Embora os novos trabalhos tenham de lhe atribuir o devido crédito e não possam ser usados para fins comerciais, os usuários não têm de licenciar esses trabalhos derivados sob os mesmos termos.