

Factors associated with frailty in hospitalized elderly: an integrative review

Fatores associados à fragilidade em idosos hospitalizados: uma revisão integrativa

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ABSTRACT This review aimed to synthesize and evaluate the production of knowledge about factors significantly associated with frailty in hospitalized elderly. Therefore, the Medical Literature and Retrieval System Online (Medline), Literatura Latino-Americana em Ciências da Saúde (Lilacs) and Índice Bibliográfico Español em Ciencias de la Salud (Ibecs) databases were consulted from 2012 to 2016, whose analysis of twenty articles identified the following factors associated with frailty: increased hospital and post-discharge mortality, prolonged hospitalization, rehospitalization, transfers, advanced age, women and widows, as well as psychosocial, physical and / or functional factors. It is expected that the results of the review will facilitate improvement of the practices and the decision-making of the multiprofessional teams that provide elderly care in the hospital.

KEYWORDS Frail elderly. Hospitalization. Aging.

RESUMO *Objetivou-se sintetizar e avaliar a produção do conhecimento sobre os fatores significativamente associados à fragilidade em idosos hospitalizados. Para isso, foram consultadas as bases de dados Medical Literature and Retrieval System Online (Medline), Literatura Latino-Americana em Ciências da Saúde (Lilacs) e Índice Bibliográfico Español em Ciencias de la Salud (Ibecs), de 2012 a 2016, cuja análise de 20 artigos identificou fatores associados à fragilidade: maior mortalidade hospitalar e após alta, longa hospitalização, reinternação, transferências, idade avançada, sexo feminino e viuvez, além de fatores psicossociais, físicos e/ou funcionais. Espera-se que os resultados da revisão facilitem o aprimoramento de práticas e a tomada de decisão das equipes multiprofissionais que prestam assistência ao idoso no ambiente hospitalar.*

PALAVRAS-CHAVE *Idoso fragilizado. Hospitalização. Envelhecimento.*

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Introduction

To the term fragility, several meanings are attributed, such as:

[...] easily breakable or destructible; what probably fails or dies quickly; particularly susceptible to diseases; with reduced strength or capacity; weak, light, thin, tenuous. (LOURENÇO, 2008, P. 23, FREE TRANSLATION).

Although there is no consensus as to its definition, in the field of geriatrics and gerontology, this term has been used to characterize the most debilitated and vulnerable elderly.

More specifically, fragility is considered a clinical syndrome that increases with age and results in a decline in the physiological reserves of the individual, reducing the efficiency of homeostasis and, consequently, the ability to perform activities of daily living. Therefore, frail elderly individuals present an increased risk for falls, hospitalizations, disability, institutionalization and death (MACEDO; GAZZOLA; NAJAS, 2008).

In this context, there are measurable characteristics that aim to identify the fragility syndrome in the elderly and that, in turn, are related to the phenotype of the individual, namely: unintentional weight loss, self-report of fatigue, decreased grip strength, reduction of physical activity and slowing gait speed (FRIED *ET AL.*, 2004 *APUD* LENARDT *ET AL.*, 2016). On the other hand, it is also affirmed that fragility is a multidimensional entity, resulting from the interaction of biological, psychological and social factors throughout the life (BERGMAN *ET AL.*, 2004 *APUD* TEIXEIRA, 2008).

Consequently, in relation to the multidimensionality of the syndrome, studies that indicate socioeconomic factors strongly associated with it are more recent, such as: insufficient income/poverty, low level of schooling, lack of social support, among others (DUARTE, 2009). Such factors, combined with the lifestyle of the elderly, presuppose the emergence of chronic diseases,

intensifying the use of hospital services, which implies higher costs of treatment, with longer duration and more difficult recovery (SOUZA *ET AL.*, 2014).

About 10% to 25% of the elderly population has some clinical aspect predicting fragility, and the fragility syndrome is an etiological factor of disability in the elderly, regardless of comorbidities (BORGES *ET AL.*, 2013; CARMO; DRUMMOND; ARANTES, 2011). Therefore, due to this causal relation between fragility and the occurrence of adverse health outcomes, it is essential to evaluate their characteristics and prevalence in the Brazilian elderly.

For Oliveira *et al.* (2013), data on fragility in the elderly are still scarce, mainly due to the lack of consensus regarding a definition that can be used in different populations. Thus, additional studies are required to improve the understanding of causal relationships, as well as to identify the manifestation of fragility under some single or multiple forms. The importance of understanding such relationships is to clarify the factors that contribute to each characteristic and how these combine to determine the fragility in individuals (SANTOS, 2008).

Considering the current and relevant theme, this article aims to synthesize and evaluate the scientific knowledge produced about the factors associated with frailty in the hospitalized elderly, an objective that was developed through an integrative review of the literature. In addition, it envisages to awaken in health professionals a greater interest in the development of scientific research that will assist health practices, especially those aimed at minimizing the prevalence of such condition in the population, thus favoring a better quality of life for the elderly.

Methods

This article presents an integrative review of the literature, considered the most comprehensive methodological approach to

bibliographic reviews, which allows the inclusion of experimental and non-experimental studies for a complete understanding of the phenomenon or health problem to be studied (SOUZA; SILVA; CARVALHO, 2010), which, in the case of the present study, is the frailty in the hospitalized elderly.

For Mendes, Silveira and Galvão (2008), this method of research aims to trace an analysis of the knowledge already constructed in previous research on a given topic and allows the synthesis of several studies already published, allowing the generation of new knowledge, based on the results presented by previous surveys.

About the construction of this review, some steps were taken, namely: 1) choice of the theme and elaboration of the guiding question; 2) choice of the databases used in the research; 3) establishment of inclusion and exclusion criteria; 4) definition of the descriptors; 5) pre-selection of articles; 6) evaluation and selection of the pre-selected studies for inclusion in the review; 7) analysis of results; 8) presentation of the integrative review.

Data collection

Data collection was carried out in the months of november and december 2016, guided by the question: 'What is the production of knowledge about the factors associated with frailty in hospitalized elderly?'. The databases were: Medical Literature and Retrieval System Online (Medline), Latin American Literature in Health Sciences (Lilacs) and Spanish Bibliographical Index on Health Sciences (Ibics).

The inclusion criteria of the studies were: articles published between the years 2012 and 2016 in the databases mentioned above, in portuguese, english and spanish, with texts available in full and that presented in their results factors significantly associated with frailty in the elderly hospitalized.

On the other hand, studies that included in their sample individuals under the age of 60 and/or hospitalized were excluded, as well as theses, dissertations, congress summaries, annals, editorials, comments and opinions and review articles.

In the evaluation of the articles on the level of evidence, the Hierarchy of Evidence for Intervention Studies (Heis) was used, which classifies the studies into seven levels: I) systematic review or meta-analysis, II) randomized clinical trials, III) clinical trial without randomization, IV) cohort and case-control studies, V) systematic review of descriptive and qualitative studies, VI) single descriptive or qualitative study and VII) opinion of authorities and/or report of specialties committees, being considered for this review only the studies classified in levels II, III, IV and VI (MELNYK ET AL., 2010).

As a search strategy for the articles, the combination (using the 'and' connector in the search field) of the following Health Sciences Descriptors (DeCS) was used: elderly, frail, and hospital, in portuguese.

The pre-selection of the articles was carried out through the detailed reading of their respective titles and summaries. Therefore, they were withdrawn duplicitously or because they did not meet the pre-established inclusion criteria. Then, the selected articles were read in full, constituting a final sample of 20 articles.

To extract and organize the data, a collection instrument adapted from the Critical Appraisal Skills Programme – Casp, elaborated by the University of Oxford, in 1993, was chosen because of its proposal of objective analysis, its systematic and easy understanding. It consists of 10 items (10 points), covering: 1) objective, 2) methodological adequacy, 3) presentation of theoretical and methodological procedures, 4) sample selection, 5) procedure for data collection, 6) relationship between researcher and researched, 7) consideration of ethical aspects,

8) procedure for data analysis, 9) presentation of results and 10) importance of the research. The studies were classified according to the following scores: 6 to 10 points – good methodological quality and reduced bias, and 5 or fewer points – satisfactory methodological quality, but with increased risk of bias. In this study, it was chosen to use only articles classified above 5 points (LONDON, 2002).

The analysis of the articles was carried out in a descriptive way, allowing the evaluation of the following research characteristics: authorship, periodical, country of origin, language, research design, year of publication, instrument used and factors associated with fragility.

Analysis and data presentation

The results were organized in a descriptive way in charts and tables, evidencing the relevant aspects of each selected study about the theme on the screen, according to Broome (2006) *apud* Botelho, Cunha and Macedo (2011) and respecting the ethical aspects regarding to the citation of the authors of the studies analyzed.

Results and discussion

In this integrative review, 20 studies that strictly met the inclusion criteria previously established were analyzed. The *table 1* presents the search results using the descriptors according to the databases (*table 1*).

Table 1. Distribution of articles found and selected by databases

Databases	Found	Pre-selected	Excluded	Analyzed
Ibics	09	-	-	-
Lilacs	17	05	01	04
Medline	433	61	45	16
Total	459	66	46	20

Source: Own elaboration.

Regarding the types of journals in which the articles included in this review were published, eight belonged to journals on geriatrics and gerontology; eight were published in palliative medicine, intensive care and surgery journals; three in nursing journals; and one in a journal focusing on health policy, management and governance.

As for the country of origin of the researches, seven articles came from the european continent (United Kingdom, the Netherlands, Belgium and Poland);

five originating in North America (United States); four from South America (Brazil); three from Oceania (Australia) and one from Asia (China). The highest number of researches carried out on the european continent, probably, is because Europe has been presenting, in recent years, a generalized aging, including a significant change in population dynamics. According to Vitoriano (2014, P. 3, FREE TRANSLATION), “aging in Europe is a result of the considerable progress made in the economic, social and health fields in terms of services provided

to Europeans” together with the various simultaneous population trends that bring low fertility rates and increased average life expectancy.

Regarding the language of the selected articles, only three (of the Lilacs base) were in portuguese, being the other publications of english language. As for the institutions of origin of the studies, only one of the articles was linked to a medical-hospital research organization, while universities and/or hospitals promoted the others.

Consequently, in relation to the research design, most of the studies were cohort type (level IV of evidence) while the others were cross sectional descriptive

(level VI of evidence). Among the cohort studies, only one was retrospective observational, based on the analysis of admission data from a tertiary health service. Regarding the time interval considered in this review, studies were found compatible with the inclusion criteria in the last five years, however, most of them were published between 2013 and 2015, which shows a constant updating of the subject addressed.

The *chart 1* presents a summary of the characterization of the articles according to the title, authors, database and periodical in which they were published, country of origin of the study, research design and year of publication (*chart 1*).

Chart 1. Distribution of articles included in the integrative review according to title, author, database and periodical, country of origin, research design, Casp score and year of publication

Nº	Title of the Article	Authors	Databases and Journal	Origin	Research Design	Casp	Year
01	Endoflife care during and after an acute hospitalization in older patients with cancer, endstage organ failure, or frailty: a sub-analysis of a prospective cohort study.	Huijberts S, Buurman BM, de Rooij SE.	Medline Palliative Medicine	Netherlands	Prospective cohort study	9/10	2016
02	Associação das variáveis socioeconômicas e clínicas com o estado de fragilidade entre idosos hospitalizados.	Tavares DMS, Pegorari MS, Dias FA, Paiva MM, Nader ID.	Lilacs Revista Latino-Americana de Enfermagem	Brazil	Cross-sectional, analytical and observational study	9/10	2015
03	Mortality in Relation to Frailty in Patients Admitted to a Specialized Geriatric Intensive Care Unit.	Zeng A, Song X, Dong J, Mitnitski A, Liu J, Guo Z, Rockwood K.	Medline Journals of Gerontology: medical sciences	China	Prospective cohort study	8/10	2015
04	Association of the clinical frailty scale with hospital outcomes.	Wallis SJ, Wall J, Biram RWS, Romero-Ortuno R.	Medline QJM: An International Journal of Medicine	United Kingdom	Retrospective observational study	9/10	2015
05	The relationship between frailty, anxiety and depression, and health-related quality of life in elderly patients with heart failure.	Uchmanowicz I, Gobbens RJJ.	Medline Clinical Interventions in Aging	Poland	Cross-sectional, analytical and observational study	8/10	2015
06	Avaliação da fragilidade de idosos internados em serviço de emergência de um hospital universitário.	Antunes JFS, Okuno MFP, Lopes MCBT, Campanharo CRV, Batista REA.	Lilacs Cogitare Enfermagem	Brazil	Cross-sectional study	9/10	2015
07	Frailty in an older inpatient population: using the clinical frailty scale to predict patient outcomes.	Basic D, Shanley C.	Medline Journal of Aging and Health	Australia	Prospective cohort study	9/10	2015

Chart 1. (cont.)

08	Psychosocial factors modify the association of frailty with adverse outcomes: a prospective study of hospitalised older people.	Dent E, Hoogendijk EO.	Medline BMC Geriatrics	Australia	Prospective observational study	9/10	2014
09	Superiority of frailty over age in predicting outcomes among geriatric trauma patients: a prospective analysis.	Joseph B, Pandit V, Zangbar B, Kulvatunyou N, Hashmi A, Green DJ, O'Keeffe T, Tang A, Vercruyse G, Fain MJ, Friese RS, Rhee P.	Medline JAMA Surgery	USA	Prospective cohort study	8/10	2014
10	Relationship between lower-limb muscle strength and functional independence among elderly people according to frailty criteria: a cross-sectional study.	Batista FS, Gomes GAO, Souza MLR, Guariento ME, Neri AL, Cintra FA, D'Elboux MJ.	Lilacs São Paulo Medical Journal	Brazil	Cross-sectional quantitative study	9/10	2014
11	The feasibility of measuring frailty to predict disability and mortality in older medical intensive care unit survivors.	Baldwin MR, Reid MC, Westlake AA, Rowe JW, Granieri EC, Wunsch H, Dam T, Rabinowitz D, Goldstein NE, Maurer MS, Lederer DJ.	Medline Journal of Critical Care	USA	Prospective unicentric cohort study	10/10	2014
12	Frailty and outcomes after implantation of left ventricular assist device as destination therapy.	Dunlay SM, Park SJ, Joyce LD, Daly RC, Stulak JM, McNallan SM, Roger VL, Kushwaha SS.	Medline Journal of heart and lung transplantation	USA	Prospective unicentric cohort study	7/10	2014
13	Relationship between frailty and discharge outcomes in subacute care.	Haley MN, Wells YD, Holland AE.	Medline Australian Health Review	Australia	Prospective observational study	10/10	2014
14	Prevalence of frailty and its ability to predict in hospital delirium, falls, and 6-month mortality in hospitalized older patients.	Joosten E, Demuyneck M, Detroyer E, Milisen K.	Medline BMC Geriatrics	Belgium	Prospective cohort study	9/10	2014
15	Predicting outcome after hip fracture: using a frailty index to integrate comprehensive geriatric assessment results.	Krishnan M, Beck S, Have-lock W, Eeles E, Hubbard RE, Johansen A.	Medline Age and Ageing	United Kingdom	Prospective cohort study	7/10	2014
16	The risk of adverse outcomes in hospitalized older patients in relation to a frailty index based on a comprehensive geriatric assessment.	Evans SJ, Sayers M, Mitnitski A, Rockwood K.	Medline Age and Ageing	USA	Prospective cohort study	7/10	2014
17	Assessing frailty in the acute medical admission of elderly patients.	Oo MT, Tencheva A, Khalid N, Chan YP, Ho SF.	Medline Journal of the Royal College of Physicians of Edinburgh	United Kingdom	Cross-sectional observational study	9/10	2013
18	Simple Frailty Score Predicts Post-Operative Complications Across Surgical Specialties.	Robinson TN, Wu DS, Pointer L, Dunn CL, Cleveland JC, Moss M.	Medline American Journal of surgery	USA	Prospective cohort study	9/10	2013
19	Fragilidade de idosos internados na clínica médica da unidade de emergência de um hospital geral terciário.	Storti LB, Marques S, Rodrigues RAP, Kusumota L, Fabrício-Whebe SCC.	Lilacs Texto & Contexto Enfermagem	Brazil	Descriptive and cross-sectional study	8/10	2013
20	Predictors of adverse outcomes on an acute geriatric rehabilitation ward.	Singh I, Gallacher J, Davis K, Johansen A, Eeles E, Hubbard, RE.	Medline Age and Ageing	United Kingdom	Observational prospective cohort study	7/10	2012

Source: Own elaboration.

Based on cautious reading of selected articles, it was possible to identify the factors significantly associated with frailty in hospitalized elderly. In this sense, *chart 2* presents in a concise way, for each study included in

the review, the instruments used to evaluate the presence of frailty in the elderly, as well as the results found regarding factors associated with this condition (*chart 2*).

Chart 2. Distribution of the articles included in the integrative review according to the instruments used in the evaluation of the frailty and results referring to the significantly associated factors in hospitalized elderly

N°	Instrument	Results
01	Multidimensional Evaluation of the Elderly	Fragility associated with delirium and/or severe cognitive impairment, preexisting comorbidities and post-discharge hospital mortality.
02	Fried Frailty Phenotype	Strong association of frailty with age equal to or higher than 80 years old, widowhood and higher number of days of hospitalization.
03	Frailty Index.	Frailty was associated with an increased risk of 30-day mortality in elderly patients admitted to the ICU.
04	Clinical Frailty Scale	Frailty as an independent predictor of inpatient mortality, transfer to a geriatric ward and hospitalization time equal to or greater than 10 days.
05	Tilburg Frailty Indicator	Increasing levels of frailty were associated with increased anxiety and depression and deterioration in the quality of life of elderly patients with heart failure.
06	Edmonton Frail Scale	Elderly people with neurological diseases, dementia, older age and with caregiver presented a higher degree of frailty.
07	Clinical Frailty Scale	The frailty predicted in-hospital mortality, readmission in Long-stay Institutions, and longer hospital stay.
08	Fried Frailty Phenotype	Fragile elderly patients were more likely to die at 12 months, high for a higher level of attention, longer hospital stay and emergency rehospitalization at one month. The associated psychosocial factors: anxiety, depression, poor perception of well-being and sense of control.
09	Frailty Index	Fragile patients were more likely to have intra-hospital complications and had an adverse disposition to hospital discharge. All elderly patients who died were fragile.
10	Fried Frailty Phenotype	There was a significant association between muscle strength of lower limb and functional independence in accordance with the number of frailty criteria.
11	Fried Frailty Phenotype	The increase in the frailty score was associated with an increase in the level of incapacity incident in one month and triple the increase in mortality in six months.
12	Deficit Index	The pre-frail and fragile patients presented an increased risk of death and re-hospitalization.
13	Edmonton Frail Scale	Elderly people with high levels of frailty achieved more satisfactory participation and development in physiotherapy sessions than those with low frailty.
14	Frailty Indexes based on the CHS (Cardiovascular Health Study) and SOF (Study of Osteoporotic Fracture)	The frailty, defined by CHS and SOF indexes, represented a risk factor for mortality in six months.

Chart 2. (cont.)

15	Frailty Index based on Multidimensional Evaluation of the Elderly	The elderly of the high fragility group remained more hospitalized and had a higher mortality rate in 30 days.
16	Frailty Index based on Multidimensional Evaluation of the Elderly	Increasing values of the fragility index were significantly associated with a longer hospitalization time and increased risk of death.
17	Multidimensional Evaluation of the Elderly	Fragility was associated with advancing age (over 85 years old), lack of mobility over 24 hours, greater number of falls, dementia/delirium and admission to Long Stay Institutions.
18	Frailty Index	Fragility was associated with increased postoperative complications in colorectal and cardiac surgeries, longer hospitalization, and higher readmission rates in 30 days.
19	Edmonton Frail Scale	Among the individuals who presented severe fragility, there was a predominance of women, of the elderly with 80 years old or more, of those who lived without partners and those who described their health as bad.
20	Frailty Index	Fragility status correlated significantly with hospital stay time and was a predictor of low functional gain.

Source: Own elaboration.

The Frailty Index, in its several versions, was the most used instrument to evaluate the fragility in the hospital environment, prevailing the model based on the Canadian Study of Health and Aging – CSHA. On this, Rockwood and Mitnitski (2007 APUD SINGH ET AL., 2012) state that valid Fragility Indexes (FIs) can be constructed from different numbers and types of variables that meet certain criteria.

Thus, in the study by Zeng *et al.* (2015) the FI was calculated by means of a ratio of 52 health deficits, being compared to other prognostic scores in the Intensive Care Unit (ICU), such as the Glasgow Coma Scale and the Karnofsky Scale which, respectively, evaluate the level of consciousness and classify the patient according to the degree of functional deficiencies; Scale of Performance in Palliative Care, among others. Joseph *et al.* (2014) used in their study the FI of 50 variables, which were obtained from the CSHA and included demographic data of the patient, social activity, daily life activities, nutritional status and general state of mood.

Krishnan *et al.* (2014) and Evans *et al.* (2014)

correlated the FI with another geriatric assessment instrument – the Comprehensive Geriatric Assessment, with the first study evaluating 51 deficits in different aspects of health, and the second calculating the FI from 55 variables that focused on cognition, function, mobility, balance, appetite and weight.

Multidimensional Evaluation of the Elderly, another tool used in four studies to support the fragility criteria, is a multidimensional diagnostic process that encompasses five essential evaluation components to determine the medical, psychological, social, environmental and functional capacities of a fragile elderly person, in order to develop a coordinated and integrated plan for the treatment and follow-up of this individual (OO ET AL., 2013).

On the other hand, the Fried's Frailty Criteria, observed in four studies, lists five components or criteria to determine the fragility, namely: unintentional weight loss, decreased muscle strength, exhaustion and/or fatigue, slowness in gaiting speed and low level of physical activity. Elderly with three

or more of these items and those with one or two pre-fragile items are classified as fragile. Those with no scoring for fragility are considered robust or non-fragile. (BALDWIN *ET AL.*, 2014; DENT; HOOGENDIJK, 2014; FRIED *ET AL.*, 2001).

Three other articles have used the Edmonton Frail Scale, which is composed of nine topics (cognition, functional performance, mood, independence, drug use, social support, nutrition, general health and continence) and which is used by health professionals to detect risk factors for frailty, to determine the level of fragility of the elderly and the main domains that need intervention (ANTUNES *ET AL.*, 2015; FABRÍCIO-WEHBE *ET AL.*, 2009; HALEY; WELLS; HOLLAND, 2014; STORTI *ET AL.*, 2013).

Therefore, it was observed that some instruments were used less frequently to evaluate, specifically, the fragility, namely: the Clinical Frailty Scale, the Tilburg Frailty Indicator, the Deficit Index and the Cardiovascular Health Study (CHS) and the Study of Osteoporotic Fracture (SOF). Furthermore, several other existing tools were correlated with the fragility indexes: the Index of Katz (Katz Index of Independence in Activities of Daily Living) and the Lawton's Scale (Lawton's Instrumental Activities of Daily Living), used to evaluate basic life activities (BLAs) and instrumental activities of daily living, respectively; Charlson Index, related to comorbidities; Elderly Mobility Scale; Quality of life questionnaire SF-36 (Health-related quality of life); Hospital Anxiety and Depression Scale; among others.

Regarding the objective of this integrative review, it was noticed that most of the studies correlated the fragility scores and their variables with other instruments capable of evaluating several aspects of the health (physical, mental, emotional and social) of hospitalized elderly in order to identify the factors associated with

frailty in these individuals (3, 5, 9, 10, 11, 13, 14, 15, 16, 18, 19). The detailed analysis of the articles allowed the selection of the main factors associated to the fragility shown below:

Factor 1: longer hospitalization time. From the total of 20 articles selected for analysis, 8 referred to the length of stay of the frail elderly in the hospital setting (2, 4, 7, 8, 15, 16, 18, 20). In this context, Tavares *et al.* (2015) and Wallis *et al.* (2015) showed that fragile elderly presented a longer average of days of hospitalization in relation to the non-fragile ones, being the time equal or superior to ten days.

In the study by Krishnan *et al.* (2014), carried out with elderly hip fracture victims and suitable for surgery, the individuals of the low fragility group remained hospitalized 21.6 days versus 67.8 days in the high fragility group. Regarding this, the other authors corroborate that the fragility state correlates significantly with the length of hospital stay. Still, as Tavares *et al.* (2015) explain, this fact may be related to the greater number of morbidities, which favors complications and complicates the recovery process.

Factor 2: higher mortality rate. Intra-hospital mortality (3, 4, 7, 11, 15, 16) and hospital post-discharge mortality (1, 8, 9, 12, 14) were outcomes evaluated in most of the studies analyzed. On this, it was verified that higher values in the fragility scores can predict intra-hospital mortality. In the study by Zeng *et al.* (2015), for example, each 1% increase in FI was associated with an 11% increase in 30-day mortality risk in elderly patients in the ICU. Likewise, as a high endpoint, the frail elderly evaluated also had a higher probability of mortality in three months (HUIJBERTS; BUURMAN; DE ROOIJ, 2016), in six months (JOOSTEN *ET AL.*, 2014) and in twelve months (DENT; HOOGENDIJK, 2014).

Factor 3: advanced age. The chronological factor was also associated with fragility in four of the studies analyzed (2, 6, 17,

19). Therefore, a higher proportion of frail elderly individuals 80 years of age or older (TAVARES *ET AL.*, 2015) and severe type (STORTI *ET AL.*, 2013) were found. In addition, patients older than 85 years were more likely to be fragile than patients aged between 75 to 85 years old (OO *ET AL.*, 2013). Consequently, for Antunes *et al.* (2015), advanced age is associated with a high rate of comorbidities and other deficits, which suggests that older patients score higher on the fragility scales.

Factor 4: readmission. The rates of hospital readmission of the frail elderly are high when compared to non-fragile individuals of the same group; is what was found in three articles (8, 12, 18). In the study by Robinson *et al.* (2013), which associated fragility variables with post-operative complications, the elderly had higher readmission rates within 30 days. The same occurred in the study by Dent and Hoogendijk (2014), in which a greater number of emergency readmissions were observed after one month. Regarding this, it is inferred that the higher rate of readmissions is due to the high number of comorbidities observed in the elderly population, especially fragile. In the study by Perez and Lourenço (2013), the risk of repeated hospitalizations among the elderly in Rio de Janeiro was associated with the presence of chronic diseases, the use of medications, the presence of falls, the poorer health status and the dependence on BLAs.

Factor 5: transfers (4, 7, 8, 17). As a result of the hospitalization, the frail elderly had a higher rate of rehospitalization and admission to Long-Term Institutions (BASIC; SHANLEY, 2015; OO *ET AL.*, 2013), as well as transference to the geriatric ward (WALLIS *ET AL.*, 2015) and high to a higher level of attention (DENT; HOOGENDIJK, 2014). In this context, the worsening of health conditions, especially marked by physical dependence, brings the elderly closer to their relatives, who do not always accept or are able to work as caregivers, increasing the demand for Long Stay Institutions for the Elderly (GALHARDO; MARIOSA; TAKATA, 2010 *APUD* NÓBREGA *ET*

AL., 2015); a fact that also commonly occurs after hospital discharge.

Other elements associated with fragility found in studies included in this review that deserve attention are: physical and/or functional factors [low mobility (17); reduced functional gain (20); functional dependency (10); disability (11); greater number of falls (17); lower muscle strength (10); preexisting disabilities (1)], psychosocial factors [anxiety (5, 8); delirium (1,17); dementia (6, 17); depression (5, 8); neurological diseases (6); severe cognitive impairment (1); low sense of control (8); decreased well-being (8); lower quality of life (5); poor self-description of health (19); low index of social activities and satisfaction in the domicile or neighborhood (8)], female (19) and widowhood or absence of the companion (2,19).

Conclusions

The present integrative review condensed the scientific productions of the last five years about the subject addressed and allowed to know the factors significantly associated with frailty in the elderly hospitalized because of several causes. In turn, these elements were considered interrelated based on the studies analyzed, regardless of the cause or effect that the fragility brings to the studied population.

Therefore, factors such as age and hospital mortality, for example, may be considered distinct when analyzed from the perspective of causality. This way, it was found that advanced age influences the occurrence of frailty, while higher mortality is related to one of the outcomes experienced by fragile elderly. Other associated factors were: longer hospitalization time, rehospitalization, transfers, female and widowhood, as well as psychosocial, physical and/or functional factors.

In this context, a great variety of elements

associated with fragility were perceived, which was justified by the different characteristics of the populations of each country, by the objectives of each research, by the instruments used and by the different samples, which resulted in some divergences of findings between the studies.

The results of this integrative review can help health professionals dealing with the hospitalized elderly both to recognize the signs of fragility and to identify the factors associated with this condition, facilitating the directing of the behaviors and the improvement of their practices, as well as the decision making of the multi-professional teams, which should consider the total biopsychosocial of the individual.

Collaborators

1. Isabelle Rayanne Alves Pimentel da Nóbrega: contributed substantially to the conception and analysis and interpretation of the data, as well as contributed significantly to the elaboration of the draft and critical review of the content and participated in the approval of the final version of the manuscript;

2. Marina Carneiro Dutra: contributed significantly to the conception and planning;

3. Luan Medeiros da Silva: contributed significantly to the elaboration of the draft;

4. Heloisa Alencar Duarte: contributed significantly in the critical review of the content. ■

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