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Dos Santos, Ednei Fernando; Aprile, Maria Rita; Castilho Alonso, Angelica; Garcez-leme, Luis Eugênio; D'andréa Greve, Julia Maria

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KNOWLEDGE ASSESSMENT INSTRUMENT ON BASIC SUPPORT OF HIP FRACTURES IN THE ELDERLY

Ednei Fernando dos Santos[1], Maria Rita Aprile[1], Angelica Castilho Alonso[2,3], Luis Eugênio Garcez-Leme[4], Julia Maria D'Andréa Greve[4]

ABSTRACT

Objective: To validate an instrument to determine the graduate students' knowledge level of health care on the basic support of life procedures, risk factors, damage and disorders in elderly patients with hip fractures. Method: A group of experts was asked to analyze the instrument in two steps. Firstly, the procedure was done subjectively and according to objective analysis using the Likert scale proposed by the Delphi method. After adjustment according to the suggestions, the version of the instrument was applied to 179 undergraduate students in the health area. Result: The instrument has achieved in its entirety and in parts (risk factors), the minimum criteria established for the Cronbach's alpha (i.e., ≥0.70). There was no change in the Cronbach's alpha (0.551) for the maintenance of initial items of the instrument, as well as the deletion of seven assessment items. Conclusion: The instrument developed has sufficient internal validity to determine the level of knowledge of undergraduate students in the health area on basic life support, damage, injuries and risk factors in elderly patients with hip fractures from falls. ***Level of Evidence III, Diagnostic Study,***

Keywords: Aged. Femoral fractures; Cardiopulmonary resuscitation. Accidental falls.

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INTRODUCTION

The most common causes of fractures are related to falls from one's own height, followed by automobile accident, and direct hit-and-trauma.[1] Hip fracture is one of the most serious causes, especially due to high mortality rate in elderly individuals.[2,3] Thirty percent of non-institutionalized elderly, suffer from falls yearly. These data are similar in Brazil,[2] based on a study of fall-associated factors from a cohort study in community resident elderly through a multidimensional evaluation questionnaire with 120 closed questions, based on the Brazilian version of OARS: *Brazilian Multidimensional Functional Assessment Questionnaire* (BOMAFQ),[2] and in the United States;[4] it was found that 5% of them suffer some type of fracture, particularly of the hip.[2] The number of hip fractures in the elderly caused by musculoskeletal frailty suggests an increase of approximately 16% in 2020 and around 32% by 2050 only in Brazil.[5] Data from the International Osteoporosis Foundation (IOF) emphasizes that the approximate cost for the fractures treatment is high and grows steadily. In Brazil expenditures range between US$ 3,900 - 12,000[4] in private hospitals, where patients stay over 11 days on average, on average. These figures do not include indirect costs associated with post-operative care, rehabilitation, productivity losses and need of care for long periods of time.[6]

Primary health care is made, generally, by people close to fall victims, but few people have proper training to provide first aid correctly and efficiently, and even health professionals may not be prepared to act in such situations.

It is, therefore, important that both healthcare professionals and the general population have enough knowledge to provide the proper care of basic life support, comprising actions taken outside the hospital, with non-invasive procedures, able to maintain vital signs.[3] Adequate knowledge of both health professionals and the population may contribute to decrease the morbidity and mortality of this type of trauma.[7]

Having a validated instrument to assess the knowledge of undergraduate students in the health area on life basic support procedures for elderly patients with hip fractures from falls, allows establishing effective teaching strategies in different undergraduate health courses.

Therefore, the aim of this study is to validate an instrument to

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1. Universidade Anhanguera, São Paulo, SP, Brazil.
2. Universidade São Judas Tadeu, São Paulo, SP, Brazil.
3. Universidade de São Paulo, Faculdade de Medicina, Laboratory of Movement Studies, Instituto de Ortopedia e Traumatologia do Hospital das Clínicas, São Paulo, SP, Brazil.
4. Universidade de São Paulo, Faculdade de Medicina, Department of Orthopedics and Traumatology, São Paulo, SP, Brazil.

Work developed at Universidade Anhanguera, Department of Body Balance Rehabilitation and Social Inclusion, São Paulo, SP, Brazil and at Universidade de São Paulo, Faculdade de Medicina, Department of Orthopedics and Traumatology, São Paulo, SP, Brazil.
Correspondence: Angelica Castilho Alonso, Rua Dr. Ovídio Pires De Campos, 333, Cerqueira Cesar, 05403-010 São Paulo, Sp, Brazil. angelicacastilho@msn.com

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determine the level of knowledge of undergraduate students in the health area on basic life support procedures, risk factors, and damage and injuries in elderly patients with hip fractures from falls.

METHODS

This study was approved by the Research Ethics Committee of *Universidade Bandeirante de São Paulo*, São Paulo, SP, Brazil, Protocol n. 196/11.

Step 1 - Instrument construction: a tool to assess the level of knowledge of undergraduate students in the health area on basic life support procedures in elderly patients with hip fractures from falls was created, made by an expert in pre-hospital care and basic life support.

The instrument is composed of four parts:

1. Identification the assessed patient (personal and anthropomorphic data) - without score;
2. Identification of risk factors for falls - score 0-18;
3. Knowledge on damage and injuries from falls -score 0- 17;
4. Basic Life Support Procedures [Australian Commission on Safety and Quality in Healthcare (2009),[5] World Health Organization (TODD, Skelton, 2004),[8] US Department of Health and Human Services (2011)[6] and Advanced Trauma Life Support (2008)[9]] - score 0-21.

The total score ranged from zero to 56 and scoring criteria were: one point for a correct answer and zero for a false alternative or "I cannot answer."

After the initial drafting of the instrument, it was evaluated by nine health experts (from the areas of Physical Education, Physiotherapy and Medicine) with professional experience in gerontology for a period not less than two years. The instrument was evaluated in two stages:

1st Assessment - Subjective assessment of the magnitude in which individual items and the overall instrument extract the intended information.[10]

2nd Assessment - Objective analysis by the Likert scale according to the systematic analysis technique proposed by the Delphi method. Delphi method's characteristics were observed: anonymity (absence of direct interaction between the experts), feedback (results are forwarded to the experts to validate their opinions), interaction (successive cycles for group consensus) and statistical analysis of the experts' opinions.[11]

Afterwards, the instrument was adjusted according to the suggestions and the third modified version of the instrument was applied to undergraduate students in the health area for analysis of internal consistency.

Validation step: After standardization of the instrument, four volunteers were selected and trained for its application in classrooms of health courses at two private universities of São Paulo state.

CASE SERIES

A total of 179 volunteers participated, 129 (72%) being women and 50 (28%), men. The mean age was 28 ± 0.5 years old and their study time was on average 14.8 ± 0.4 years. Academic characteristics of individuals are described in Table 1.

Inclusion criteria: Undergraduate students of the health area attending the last year of Physical Education, Nursing, Physiotherapy or Medicine courses who agreed to participate. All participants signed a free and informed consent.

Table 1. Academic characteristics and information about contact with the topic basic life support, damage and injuries and risk factors (n=159).

		Frequency	Percentage
Course	Physical Education	5	3
	Nursing	65	36
	Physiotherapy	30	17
	Medicine	79	44
Semester	Tenth	40	22
	Second	1	1
	Fifth	1	1
	Sixth	28	15
	Seventh	39	22
	Eighth	40	22
	Ninth	30	18
Contact with the topic	Yes	158	88
	No	21	12
Semester in which respondents had contact with the topic	First	5	3
	Second	12	7
	Third	16	9
	Fourth	39	22
	Fifth	15	8
	Sixth	25	14
	Seventh	41	23
	Eighth	3	2
	Ninth	2	2
	Tenth	1	1

Statistical analysis

The analysis of internal consistency was made through Cronbach's alpha greater or equal to 0.70.[12] Items or questions were deleted when the correlation between items was less than 0.20.[2] Data are presented as frequencies and percentages or mean ± mean standard error. The level of significance was $p < 0.05$. All analyzes were performed with SPSS version 20.0 (PASW Inc., Chicago, IL).

RESULTS

The results regarding the proportion of explanation of each item in relation to the parts (between items), as well as each part regarding the entire instrument (inter-parts) are presented through values of Cronbach's alpha[13] in Table 2.

Table 2 shows that all parts (except for risk factors) and the entire instrument reached the minimum criteria established for Cronbach's alpha (i.e., ≥ 0.70).

Only seven of the 18 items that constitute the part referring to risk factors were kept because of the correlation values between the items are lower than 0.20. (Table 3) The exclusion of the variables did not significantly alter Cronbach's alpha (0.551), suggesting that seven items explain the same variability than the previous 18 items.

One item was deleted in the part referring to damage and injuries and two items in basic life support (questions 10 and 18). (Table 4)

The scores were also analyzed according to the part and the whole instrument. The scores ranged within the expected range for the parts and the whole instrument: risk factors, 13.63 ±

Table 2. Cronbach's alpha according to parts and the total instrument.

Parts	Cronbach's Alpha	Number of items
Risk factors	0.579	18
Damage and injuries	0.748	17
Basic life support	0.837	55
Total	0.849	90

Table 3. Inter-item correlation and Cronbach's alpha for risk factors.

	Inter-item correlation	Cronbach's alpha if the item was excluded
Ingesting alcoholic beverages alters the senses that potentiate the risk of falls;	-0.024	0.585
Half of the falls is due to environmental causes (slippery or uneven floors, areas, inadequate lighting and paving);	0.071	0.580
Half of the number of falls occur in their own homes;	0.143	0.573
Incontinence and cognitive disorders are also often present in victims of falls;	0.325	0.540
Cognitive disorders are clearly associated with increased risk of falls;	0.272	0.551
Caucasians fall more often than African descents, Latino or Asian;	0.172	0.569
Muscle weakness, gait disorders, loss of balance and use of assistive devices are risk factors for falls;	0.076	0.579
The prevalence of falls increases with age;	0.098	0.577
Balance and mobility limitations substantially contribute to the risk of falls;	0.295	0.559
There is a significant increase in the risk of falls with the use of medicines as psychotropic drugs, antiarrhythmic drugs, digoxin, diuretics and sedatives;	0.346	0.539
Orthopedic abnormalities, loss of sensitivity and inappropriate footwear are associated with high risk of falls;	0.159	0.570
The presence of circulatory diseases, chronic obstructive pulmonary disease, depression and arthritis are associated with high risk of falls;	0.327	0.538
The risk of fractures in men is half that observed in women;	0.192	0.569
Dizziness, vertigo and syncope are common causes of falls;	0.172	0.569
Elderly people often slip and stumble, besides having inefficient mechanisms to preventing falls;	0.100	0.578
Institutionalized elderly fall more often than those living in community;	0.188	0.569
The visual safety, contrast sensitivity, cataracts, glaucoma, macular degeneration and the use of bi-and multifocal lenses contribute to falls;	0.219	0.561
Fear of falling is reported by a large proportion of victims of falls.	0.350	0.541

0.17 (range 7-18); damage and injuries, 10.52 ± 0.28 (range, zero-17); basic life support, 15.31 ± 0.26 (range 3-21). The total score was 39.49 ± 0.51 (range 17-52).

In general, most individuals reached knowledge level greater than 70% in different items (except for damages and injuries) and for the total score. (Table 5)

DISCUSSION

The results provided evidence that the elaborated instrument has sufficient internal consistency to level analysis[13] of knowledge in basic life support of undergraduate students on the health area, indicating that it may be used as an evaluation tool. They also showed that knowledge in damage and injuries caused by hip fractures in the elderly can be isolatedly measured, which was not observed regarding risk factors.

The results support the hypothesis by Morrow *et al*.[10] that the exclusion of certain items does not change the magnitude of the observed variability in the instrument version applied to individuals. The exclusion of items improves the accuracy of the instrument by lowering repetitions, filling up time and maintenance of intrinsic motivation.

Table 4. Inter-item correlation and Cronbach's alpha for damages and injuries.

	Inter-item correlation	Cronbach's Alpha if the item was excluded
Depression, fear of falling and other psychological problems – the "post-fall syndrome" – are common effects after repeated falls;	0.177	0.746
Most undamaged falls are often never reported to health professionals;	0.248	0.743
The loss of self-confidence, confusion and social isolation can occur after falls even without damages;	0.295	0.739
Laying in the ground for more than 12h after a fall is associated with blood pressure issues, dehydration, hypothermia, pneumonia and death;	0.298	0.739
Falls are the factor responsible for most of the admissions to long term care facilities;	0.416	0.729
A fall without damage can still be fatal if the person is unable to get up from the ground and ask for help;	0.410	0.729
Hip fractures account for about 25% of fractures caused by falls in community resident elderlies;	0.316	0.737
The most common age-related fractures are in the wrist, spine, hip, humerus and pelvis;	0.294	0.739
Falls are the leading cause of death for people over 65 years old;	0.325	0.736
Mortality and hospitalization rates due to damages resulting from falls increase exponentially with age;	0.270	0.741
About 20% of deaths related to falls in people over 85 years old occur in long term care facilities;	0.318	0.752
Half of those who fall require help to get up after the fall;	0.229	0.744
Half of fall victims with hip fractures never return to walk properly;	0.438	0.726
In a period of one year after the fall, 20% of victims are either still in hospital, require full-time care or die;	0.465	0.724
The damage caused by falls lead to five times more hospital admissions than those caused by other reasons;	0.483	0.722
Elderly people who fall once are two to three times more likely to fall again within a one year period;	0.356	0.734
At least 95% of hip fractures are caused by falls among institutionalized individuals.	0.419	0.729

Table 5. Proportion of individuals that reached a score higher than 70% according to parts and the total instrument.

	Lower than 70%	Higher than 70%	Total
Risk factors (13)	51 (29)	126 (71)	177 (100)
Damage and injuries (12)	107 (60)	71 (40)	178 (100)
Basic life support (15)	45 (25)	134 (75)	179 (100)
Total	76 (43)	101 (57)	177 (100)

The two cycles of analysis of the instrument contributed decisively to its suitability, improving the objectivity, due to the lower number of questions and items per question, while maintaining the four parts of the instrument. The Delphi method is a good analytical tool used in the second version of the instrument, which allowed verifying the maintenance of the average score higher than four (on a scale from one to five) for most of the items. This data is similar to that found in other validations of the assessment instrument.[10,13] Few items had an average score lower than four [number of parts, content of each part (prevalence), content of items from each part (prevalence). These data were excluded.[10]
Seventy-five percent of the assessed individuals had more than 70% of the required knowledge in different situations that required basic life support measures. However, a great number of individuals do not know about damage and injuries caused by falls from height, a fact that suggests the need to implement guidance and training policies to university students and health professionals that shows the consequences of a fall.
The developed instrument has satisfactory accuracy, but does not allow wide extrapolation of the results, due to the lack of proportionality between the analyzed courses and also the intergroup analysis (i.e., academic area and semester of contact with the topic basic life support).

The socio-demographic variables[14] (socioeconomic status, academic curriculum, geographic region) can help to satisfactorily predict the level of knowledge in basic life support. This study is the first to analyze the level of knowledge in basic life support, risk factors and damage and injuries in undergraduate students in the health area. This strategy, besides allowing improving knowledge regarding key emergency response strategies to fractures related to falls from height, also allowed us to analyze the main risk factors, as well as damages and injuries associated with falls.
However, a quarter of the volunteers assessed do not know what should be the basic life support strategies in elderly patients with hip fractures resulting from falls. This result suggests that if damages and injuries were dependent solely on the immediate care of victims, 25% of them could have their injuries aggravated by the care provided.

CONCLUSION

The elaborated instrument has sufficient internal validity to determine the level of knowledge of undergraduate students in the health area on basic life support, damage and injuries and risk factors in elderly patients with hip fractures resulting from falls.

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