

Cultural and linguistic adaptation and validation of the Morse Fall Scale

Adaptação cultural e linguística e validação da Escala de Quedas de Morse
Adaptación cultural y lingüística y validación de la Escala de Caídas de Morse

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Abstract

Background: Patients' falls are the most commonly reported safety incident in hospitals. Falls have clear consequences on the patient, family and health professionals. Prevention interventions should be prescribed based on each patient's fall risk assessment. This assessment may be performed using scales such as the Morse Fall Scale (MFS). Despite being used in several hospitals, this scale was never formally validated until now.

Objectives: To assess the degree of reproducibility of the MFS in hospital settings and examine its validity through correlations with other measuring instruments.

Methodology: The study was conducted in two hospitals in the Lisbon area using a sample composed of 120 nurses, who applied the MFS to 200 patients. Each patient was assessed three times with the MFS by three different nurses. A total of 600 assessments were performed.

Results: The Portuguese version is semantically and culturally equivalent to the original, with good reliability (intraclass correlation coefficient of 0.838 and interobserver agreement between 0.615 and 0.964, assessed using the mean kappa coefficient) and satisfactory convergent validity.

Conclusion: The Portuguese version is recommended for use in hospital context.

Keywords: accidental falls; risk management; hospital services.

Resumo

Enquadramento: A queda do doente é o incidente de segurança mais reportado no contexto hospitalar. As quedas têm óbvias consequências no doente, na família e nos profissionais de saúde. A prescrição de intervenções de prevenção deve basear-se na avaliação do risco de queda apresentado por cada doente, o qual pode ser avaliado através de escalas como a Escala de Quedas de Morse (MFS). Esta escala encontra-se introduzida em diversos hospitais, no entanto sem qualquer validação formal até agora.

Objetivos: Avaliar o grau de reprodutibilidade da MFS em contexto hospitalar e analisar a sua validade através das correlações com outros instrumentos de medida.

Metodologia: O estudo decorreu em dois hospitais da zona de Lisboa e participaram 120 enfermeiros que aplicaram a MFS a 200 doentes. A cada doente foram realizadas três avaliações da MFS, por três enfermeiros diferentes, obtendo-se 600 avaliações.

Resultados: A versão portuguesa obtida é semântica e culturalmente equivalente à original, com uma boa fiabilidade (coeficiente de correlação intraclass de 0,838 e concordância entre observadores, avaliada pela média dos coeficientes K, entre 0,615 e 0,964) e validade convergente satisfatória.

Conclusão: Conclui-se recomendando a sua utilização nas organizações de prestação de cuidados hospitalares.

Palavras-chave: acidentes por quedas; controle de risco; serviços hospitalares.

Resumen

Marco contextual: La caída de los pacientes es el incidente de seguridad más comunicado en el contexto hospitalario. Las caídas tienen consecuencias evidentes en los pacientes, la familia y los profesionales de la salud. La prescripción de las intervenciones para prevenir caídas debe basarse en la evaluación del riesgo de caída que presenta cada paciente, que puede ser evaluado mediante escalas como la Escala de Caídas de Morse (MFS). Esta escala se encuentra introducida en varios hospitales, sin embargo todavía no cuenta con una validación formal.

Objetivos: Evaluar el grado de reproducibilidad de la MFS en el contexto hospitalario y examinar su validez a través de las correlaciones con otros instrumentos de medición.

Metodología: El estudio se llevó a cabo en dos hospitales de la zona de Lisboa y participaron 120 enfermeros, que aplicaron la MFS a 200 pacientes. A cada paciente, tres enfermeros diferentes le realizaron tres evaluaciones de la MFS, de forma que se obtuvieron 600 evaluaciones.

Resultados: La versión portuguesa es semántica y culturalmente equivalente a la original y que tiene una buena fiabilidad (coeficiente de correlación intraclass de 0,838 y acuerdo entre observadores, evaluada mediante la media del coeficiente K, entre 0,615 y 0,964) y una validez convergente satisfactoria. De ello resulta que la versión portuguesa es semánticamente equivalente a la versión original.

Conclusión: En conclusión, su uso se recomienda en las organizaciones de atención hospitalaria.

Palabras clave: accidentes por caídas; control de riesgo; servicios hospitalarios.

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Introduction

The prevalence of patient falls is an indicator of hospital patient safety and nursing-sensitive patient outcome. Research evidence and hospital admission statistics suggest that hospital patients are at a greater risk of falling than people in the community (Healey & Scobie, 2007). Patient falls are the most common security incidents reported in hospital settings (Healey & Scobie, 2007; Oliver et al., 2007; Perell, Nelson, Goldman, Prieto-Lewis, & Rubenstein, 2001), which impact on patients, relatives and the health professionals themselves. They can lead to anguish, pain, physical damage, loss of confidence and loss of independence in patients. With regard to relatives, they can lead to formal complaints and litigation cases with the hospital, as it is understandable that they are unhappy when a hospitalised relative falls and suffers personal damage while they expect the hospital to be a safe place. Concerning the professionals themselves, although they strive to prevent more vulnerable patients from falling, it is a constant source of anxiety and burnout whenever a patient suffers from injuries caused by a fall (Healey & Scobie, 2007; Kohn, Corrigan, & Donaldson, 2000; Oliver, Daly, Martin, & McMurdo, 2004; Perell et al., 2001). Fall risk is assessed using risk assessment scales, i.e., tools that assign numerical values to specific risk factors (Healey & Scobie, 2007). These values are generally added together to predict whether the patient is at a low, medium or high risk of falling (Morse, 2009). A report drawn up by the General Inspection of Health Activities on hospital falls (Soares & Almeida, 2008) states that the Morse Fall Scale (MFS) is the most commonly used scale in Portuguese hospitals, although it should be highlighted that it is being used without ever being validated for the Portuguese population. This study aims to assess the degree of reproducibility of the MFS in hospital settings and contribute to its validity by examining its correlations with other measuring instruments.

Background

Risk assessment scales have been examined in the systematic literature reviews concerning risk prediction (Morse, 2009; Oliver, Britton, Seed,

Martin, & Hopper, 1997). However, outside the scope of the original research studies, only two scales were tested in different groups of patients (Oliver et al., 2004), one of them being the MFS. There is, however, a need to draw attention to the fact that even the best scales may underpredict or overpredict the risk of patients falling (Oliver, 2008). In addition, scales are designed to predict the risk, which is not the same as effectively preventing the fall. By itself, the score measured by the scales does not define the interventions. The purpose of fall risk assessment scales is to quickly identify fall-prone patients so as to implement strategies to prevent harm to patients (Morse, 2006).

The MFS was developed by Janice Morse in 1985 at the University of Alberta, Canada, based on a study with a sample composed of 100 patients with falls and 100 patients without falls who had been randomly selected (Morse, 2009). It was independently tested by other organisations and authors and is intended for adults in general (Morse, 2006). This scale consists of six items reflecting risk factors of falling (Morse, 2009; Morse, Morse, & Tylko, 1989). Its predictive validity and its interrater reliability have been demonstrated (Morse, 2006).

The MFS is particularly important at the time of patient admission, in particular for people aged 65 years or more, confused patients or patients with psychomotor agitation, patients in the postoperative period, patients taking fall-risk-increasing drugs, such as psychotropic drugs, analgesics or antihypertensives (Leipzig, Cumming, & Tinetti, 1999a; Leipzig, Cumming, & Tinetti, 1999b) among others, contributing to an appropriate fall prevention intervention plan for patients in hospital settings.

According to the scale's author, most nurses (82.9%) describe this scale as "quick and easy-to-use". She estimates that it takes less than 3 minutes to assess a patient (Morse, 2009; Morse et al., 1987).

Patients may have different characteristics in different countries and hospitals. For this reason, the explanation provided for each item on how the scale should be understood and interpreted is essential so that everyone uses the scale in the same way. The literature review draws attention to the possibility that a scale, even if tested in a given hospital, might not predict the risk of falling in a different hospital (Morse, 2009). Therefore, with the validation of the Portuguese version of the MFS, we will be able to

assess the risk of falling in a more secure and adjusted way to the Portuguese reality. The use of the MFS by the Portuguese nurses will only be scientifically valid after its cultural and linguistic adaptation and after it shows good interrater reproducibility and recognised validity indicators.

Methodology

The cultural and linguistic adaptation into Portuguese of the English version of the MFS was carried out after the author's formal authorisation was obtained. The process followed the norms of the *International Society for Pharmacoeconomics and Outcomes Research (ISPOR) Task Force for Translation and Cultural Adaptation* (Wild et al., 2005), including: (1) two independent translations performed by two Portuguese translators; (2) a first version of consensus; (3) a back-translation performed by a native English-speaking translator; (4) comparative analysis between the back-translation and the original version; (5) changes resulting from the comparative analysis; (6) review of the first Portuguese version. The first Portuguese version was then reviewed by a specialist, who was asked to pay special attention to

the technical terms included in the questionnaire. For each scale item, the specialist was given the original version and the final consensus translation, and was asked if he was satisfied with the item's translation or, on the contrary, if he had any suggestion to make. The expert agreed with the translation of all items. Since the scale is designed to be completed by nursing professionals, a cognitive assessment and the interpretation test by a sample of patients were not performed on a sample of patients. Finally, the Portuguese version of the MFS was submitted to another expert, who suggested no changes regarding the Portuguese language and grammar. Table 1 shows the items of the MFS - Portuguese version. The total score of the scale varies between 0 and 125 points and individuals are divided based on their fall risk into: no risk (0-24), low risk (25-50) or high risk (≥ 51). Reliability was tested in each service where the study took place and it was conducted by groups of three nurse observers, in a total of 120. The nurses independently assessed the risk of falling in the same patient. Each nurse made five assessments. A 15-minute explanation of the scale was given to the participant nurses as they were already familiar with the scale.

Table 1
Items of the Portuguese version of the Morse Fall Scale

Item	Score
1. Historial de quedas; neste internamento urgência/ ou nos últimos três meses	
Não	0
Sim	25
2. Diagnóstico(s) secundário(s)	
Não	0
Sim	15
3. Ajuda para caminhar	
Nenhuma/ajuda de enfermeiro/acamado/cadeira de rodas	0
Muletas/canadianas/bengala/andarilho	15
Apoia-se no mobiliário para andar	30
4. Terapia intravenosa	
Não	0
Sim	20
5. Postura no andar e na transferência	
Normal/acamado/imóvel	0
Debilitado	10
Dependente de ajuda	20
6. Estado mental	
Consciente das suas capacidades	0
Esquece-se das suas limitações	15

Face (content) validity was examined through a comprehension test given to a panel of experts consisting of six health professionals. A cognitive test was performed so as to evaluate the clarity, comprehension, cultural relevance, inclusion of all concepts, as well as the redundancy and ambiguity of the items. The remaining validation tests were conducted during the first trimester of 2011 in central Lisbon at a private hospital, which was identified as A (two medical-surgical hospitalisation units, a long-term and palliative care unit and an intensive care unit), and at a hospital centre, which was identified as B (eight medical units, a pneumology unit, a neurology unit, three neurosurgery units, a cerebrovascular unit, a cardiothoracic surgery unit, a vascular surgery unit, a cardiology unit and a general surgery unit). The sample was composed of 200 patients and was obtained through an accidental non-probabilistic method. It was composed of the patients who were available at the time of the study, of whom 110 (55%) were followed at the hospital and 90 (45%) at the hospital centre B. The inclusion criteria were patients being 18 years old or more and the units having already introduced the MFS in their record-keeping standards so as to ensure a more homogeneous use of the scale.

Data collection used a registration grid to assess fall risk and characterise the patient, always ensuring the patient's anonymity and confidentiality. The ethical procedures recommended in both institutions were followed and the necessary authorisations were duly obtained. Data were processed using the statistical software program SPSS® - *Statistical Package for the Social Sciences*, version 18 for Windows®. Results were analysed using measures of correlation, central tendency, dispersion, and parametric tests.

Reliability was assessed based on the agreement of the results recorded by nurses (Terwee et al., 2007). Cohen's kappa coefficient was used with the following ranges: moderate agreement, 0.41-0.60, substantial agreement, 0.61-0.80, and almost perfect agreement, 0.81-1.00 (Kramer & Feinstein, 1981).

Validity was tested through criterion validity and construct validity. As for criterion validity, which, according to the COSMIN panel (Mokkink et al., 2010), represents the degree to which the scores of a measuring instrument are an adequate reflection of a gold standard, a correlation was calculated between the MFS and other measuring instruments used in the

hospitals where the study was conducted, that is, the Glasgow Coma Scale and the Barthel Index. However, as it was not possible in this case, as in many others, to obtain a standard measure that would surpass the MFS, some items of this scale were compared to the final scores or other items from other measures of reference. Examples of this are the comparisons between the mental status item of the MFS and the Glasgow Scale, and the gait and ambulatory items of the MFS and some items of the Barthel Index.

Construct validity, which, according to the COSMIN panel (Mokkink et al., 2010), is the degree to which the scores of a measuring instrument are consistent with previously defined hypotheses or group scores, was tested through the contrasting groups method, i.e. by comparing values from different groups, such as age, gender, history of falling, psychomotor agitation and type of patient medication. Spearman's correlation coefficient was used in both criterion validity and construct validity. Its values ranged from +1 (perfect positive/direct correlation) to 0 (no correlation), and then -1 (perfect negative/inverse correlation), in which, in absolute value, a number up to 0.33 indicated a weak correlation, between 0.34 and 0.66 indicated a moderate correlation, and above 0.67 indicated a strong correlation (Choudhury, 2009). In construct validity tests, parametric tests of differences between means and the χ^2 test of independence were used.

Results

Sample Characterisation

A total of 600 MFS evaluations were performed, since each record included three observations on the same patient by three different nurses on the same shift. Table 2 shows that most patients were hospitalised in medical-surgical units (57.5%), with a slight majority of male participants (52%), and were on average 72 years old, with a standard deviation (SD) of 13.7. The most common age was 72 years and the median was also 72 years, with patients ranging between 23 and 98 years old. The vast majority of patients (77.5%) were over 65 years old. The largest age group (34.0%) was the 75-84 age group. The main reason for admission was surgery (19.5%) and the most prevalent pathologies that led to the remaining hospital admissions were infectious diseases (16.5%), heart diseases (16.5%),

and neurological diseases (9.5%). Most nurses applied the scale at the time of patient admission (58%), but it was also applied during reassessments (40%) and after the fall (2%). The main reasons for the application of the scale were the policy of the organisations studied, which defined that the records should include the use of the MFS, patient's age, history of falling and, finally, psychomotor agitation. It was found that patients were taking fall-

risk-increasing drugs, in which the most commonly prescribed ones were antihypertensives (38.1%), psychotropic drugs (25.5%) and analgesics (11.9%). It was also found that 30% (60) of patients were taking two fall-risk-increasing drugs, 27.5% (55) were taking one fall-risk-increasing drug and 13.5% (27) were taking three fall-risk-increasing drugs. The average number of fall-risk-increasing drugs per patient was 1.6 with a *SD* of 1.2.

Table 2

Characteristics of patients and hospitalisations (n = 200)

Variables	Characteristics	No.	%
Hospital	A	110	55.0
	B	90	45.0
Services	Medicine / Surgery	115	57.5
	Medical specialties	18	9.0
	Surgical specialties	27	13.5
	Intensive care unit	15	7.5
	Long-term / palliative care	25	12.5
Gender	Male	104	52.0
	Female	96	48.0
Age	Less than 35 years	6	3.0
	Between 35 and 44 years	5	2.5
	Between 45 and 54 years	8	4.0
	Between 55 and 64 years	26	13.0
	Between 65 and 74 years	57	28.5
	Between 75 and 84 years	68	34.0
	More than 84 years	30	15.0
Reason for hospitalisation	Surgery	39	19.5
	Infectious disease	33	16.5
	Heart disease	33	16.5
	Neurological disease	19	9.5
	Respiratory disease	15	7.5
	Digestive system disease	12	6.0
	Cancer	12	6.0
	Rehabilitation	9	4.5
	Others	9	4.5
	Cerebrovascular disease	8	4.0
	Vascular disease	8	4.0
	Liver disease	3	1.5
Time of application	Admission	116	58.0
	Reassessment	80	40.0
	After fall	4	2.0
Type of drugs*	Analgesics (2.12)	37	11.9
	Antiepileptics and anticonvulsants (2.6)	19	6.1
	Psychotropic drugs (2.9)	79	25.5
	Antihypertensives (3.4)	118	38.1
	Digitalis (3.1.1)	15	4.8
	Insulin (8.4.1)	29	9.4
	Oral antidiabetics (8.4.2)	13	4.2
Number of drugs	No drugs	45	22.5
	One drug	55	27.5
	Two drugs	60	30.0
	Three drugs	27	13.5
	Four drugs	10	5.0
	Five drugs	3	1.5

* Therapeutic groups classified according to the "Prontuário Terapêutico" of the Infarmed (National Authority of Medicines and Health Products) - 8

Based on the risk score, it was found that 278 (46.3%) observations were assessed as high fall risk, 224 (37.3%) as low fall risk and 98 (16.3%) as no fall risk. The mean risk score for the 600 assessments was 50.2 points, with a *SD* of 24.2.

The average time to complete the scale was 5 minutes and no problems were found with its application.

As previously mentioned, other scales were also applied to 71 (35.5%) patients, the most common

ones being the Glasgow Coma Scale and the Barthel Index. Table 3 shows the distribution of scores for these two indicators. As can be seen from Table 3, the mean level of severity of the sample under study, which was measured by the Glasgow Coma Scale, was very low, while the patients' degree of dependence, as measured by the Barthel Index, could be considered as moderate.

Table 3
Scores obtained in the Glasgow Coma Scale and the Barthel Index

Indicator		No.	%	Min	Max	Mean	SD
Glasgow Coma Scale	Sum	49		7	15	13.57	±1.97
	Eye Opening	49		2	4	3.96	±0.29
	Verbal Response	49		1	5	3.94	±1.36
	Motor Response	49		4	6	5.67	±0.66
Level of severity of the Glasgow Coma Scale	0 (No severity)	38	77.6				
	1	10	20.4				
	2	1	2.0				
Barthel Index	Sum	39		0	100	39.10	±33.79
	Total	15	38.5				
	Severe	5	12.8				
Barthel degree of dependence	Moderate	6	15.4				
	Mild	11	28.2				
	Independent	2	5.1				

Reliability/Reproducibility

With regard to reliability, the overall analysis of the distribution of frequencies per indicator showed a high level of agreement between nurses (Table 4). The greatest differences were found between raters 2 and 3 in the item gait/transferring, concerning the

indicator weak, with a frequency of 58 (29%) versus 47 (23.5%), and between raters 1 and 2, with a frequency of 49 (24.5%) versus 58 (29). In the same item, concerning the indicator normal/bed rest/immobile, a frequency of 94 (47%) versus 85 (42.5%) between raters 1 and 2 was observed.

Table 4
Distribution per item of agreement between raters

Items	Assessment 1		Assessment 2		Assessment 3	
	No.	%	No.	%	No.	%
History of falling						
No	166	83.0	168	84.0	168	84.0
Yes	34	16.0	32	16.0	32	16.0
Secondary Diagnosis						
No	36	18.0	29	14.5	32	16.0
Yes	164	82.0	171	85.5	168	84.0
Ambulatory aid						
No help/nurse assist /bed rest/wheelchair	145	72.5	152	76.0	151	75.5
Crutches/Canadian crutches/cane/walker	27	13.5	25	12.5	24	12.0
Grasps on furniture for support to walk	28	14.0	23	11.5	25	12.5
IV Therapy						
No	51	25.5	51	25.5	50	25.0
Yes	149	74.5	149	74.5	150	75.0

Gait/Transferring						
Normal/bed rest/immobile	94	47.0	85	42.5	89	44.5
Weak	49	24.5	58	29.0	47	23.5
Impaired	57	28.5	57	28.5	64	32.0
Mental status						
Oriented to own ability	140	70.0	143	71.5	140	70.0
Forgets limitations	60	30.0	57	28.5	60	30.0

Table 5 analyses the level of interrater agreement which ranged between 0.615 in the item *secondary diagnosis* and 0.964 in the item *history of falling*. The analysis of the mean kappa coefficient showed that the item *ambulatory aid* had the lowest level of agreement (0.619), while the item *history of falling* had the highest level of agreement (0.927). In this analysis, it was found that the items *history of falling*, *iv therapy* and *mental status* showed an almost

perfect agreement. The items *secondary diagnosis*, *ambulatory aid* and *gait/transferring* showed a significant level of agreement.

The intraclass correlation coefficient between the three nurses' assessments of each patient showed a level of agreement of 0.838, associated with a 95% confidence interval of]0.800; 0.870[and a high level of agreement, which indicates good reproducibility (Kramer & Feinstein, 1981; Terwee et al., 2007).

Table 5
Level of interrater agreement

Items	Kappa	Standard error	Mean Kappa
History of falling			0.927
Rater 1 Vs. Rater 2	0.927	0.036	
Rater 1 Vs. Rater 3	0.964	0.026	
Rater 2 Vs. Rater 3	0.963	0.026	
Secondary Diagnosis			0.657
Rater 1 Vs. Rater 2	0.615	0.076	
Rater 1 Vs. Rater 3	0.646	0.073	
Rater 2 Vs. Rater 3	0.710	0.070	
Ambulatory aid			0.619
Rater 1 Vs. Rater 2	0.639	0.058	
Rater 1 Vs. Rater 3	0.582	0.062	
Rater 2 Vs. Rater 3	0.635	0.061	
IV Therapy			0.912
Rater 1 Vs. Rater 2	0.921	0.032	
Rater 1 Vs. Rater 3	0.881	0.039	
Rater 2 Vs. Rater 3	0.934	0.029	
Gait/Transferring			0.639
Rater 1 Vs. Rater 2	0.637	0.045	
Rater 1 Vs. Rater 3	0.642	0.045	
Rater 2 Vs. Rater 3	0.639	0.045	
Mental Status			0.816
Rater 1 Vs. Rater 2	0.867	0.039	
Rater 1 Vs. Rater 3	0.786	0.048	
Rater 2 Vs. Rater 3	0.795	0.047	

Criterion Validity

To test criterion validity, the relationship between the Portuguese version of the MFS (mean scores assigned to each patient by the three raters) and the Glasgow Coma Scale and the Barthel Index was analysed. For

example, one would expect question 6 of the MFS ('mental status') to be significantly correlated with the total index of the Glasgow Coma Scale and, possibly, with any of its dimensions (Table 6).

Table 6
Means (\pm SD) of the Glasgow Coma Scale

Mental Status (MFS ₆)	Eye Opening	Verbal Response	Motor Response	Glasgow Total
Oriented to own ability	4.00 \pm 0.00	4.33 \pm 1.17	5.79 \pm 0.59	14.12 \pm 1.60
Forgets limitations	3.92 \pm 0.40	3.56 \pm 1.45	5.56 \pm 0.71	13.04 \pm 2.17
Mann-Whitney U test	288	186	245	180
Significance	0.327	0.014	0.131	0.011

Thus, there is a significant difference between the Glasgow Scale scores and the different levels of mental status indicated by the MFS, i.e. individuals who are oriented to own abilities obtain higher scores in the Glasgow Scale.

On the other hand, questions 8 ('transfer'), 9 ('mobility') and 10 ('stairs') of the total Barthel Index should be correlated with questions 3 ('ambulatory aid') and 5 ('gait/transferring') of the MFS, considering that they are associated with the concept of mobility and the activities of daily living. In fact, individuals who are oriented to own abilities (MFS₆=0) obtained a more oriented verbal response and a significantly higher total score in the Glasgow Scale.

As for the Barthel Index, item 8, related to transfer (either independent or not independent), was associated with question 3 ('need for ambulatory aid or not') of the MFS ($\chi^2=9.1; gl=1; p<0.005$). Similar results were obtained in item 9, related to independence in mobility ($\chi^2=9.8; gl=1; p<0.005$), and item 10, related to the use of stairs ($\chi^2=3.6; gl=1; p<0.05$). The item gait/transferring, measured by question 5 of the MFS, was not associated with the patient's independence in transferring, in mobility or even in the use the stairs.

Construct validity

To test construct validity, the mean scores of the MFS were correlated with variables such as gender, age, history of falling and psychomotor agitation, and significant score changes were expected depending

on the group analysed. The association between the mean scores and the three most frequently prescribed drugs to patients was also analysed. According to previous experience, it would be expected for men to have a higher risk of falling (because, indeed, they do fall more frequently). The same was true for older patients. Previous falls and a greater psychomotor agitation should also be associated with a higher risk of falling assessed by the MFS. In addition, apparently more sedated individuals should also have a higher risk of falling. Despite the male risk of falling being, on average, higher than that of women (50.82 \pm 24.33 *vs.* 48.54 \pm 23.69; $p<0.001$), the difference was mild but not significant. In relation to age, the mean risk of falling of younger patients was clearly lower than that of older patients (34.67 \pm 22.97 *vs.* 54.09 \pm 22.53; $p<0.001$). The same was true for patients with no previous falls during the same hospitalisation period or emergency episode, or over the last three months (45.81 \pm 22.69 *vs.* 68.82 \pm 21.04; $p<0.001$), and for those with no psychomotor agitation (47.14 \pm 23.39 *vs.* 66.29 \pm 21.37; $p<0.001$).

Figure 1 represents these differences graphically.

Finally, in relation to the three classes of drugs which are most commonly prescribed to patients among sedating (analgesics, antiepileptics and anticonvulsants, psychotropic drugs) and non-sedating drugs (antihypertensives, digitalis, insulin and oral antidiabetics), sedated patients had a higher risk of falling than non-sedated patients (45.61 \pm 23.50 *vs.* 53.76 \pm 23.90; $p<0.05$).

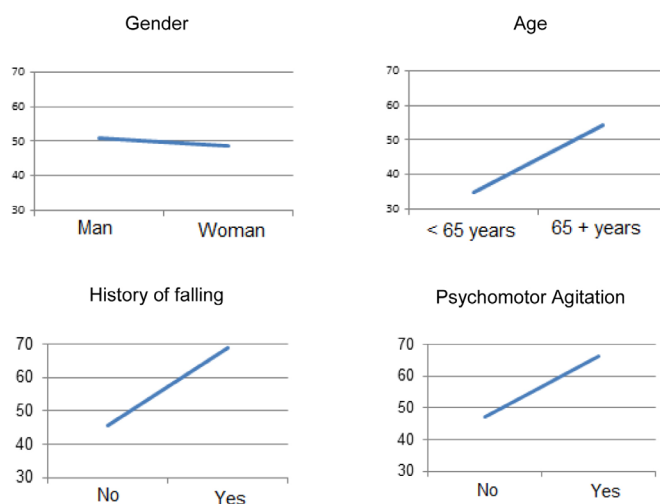


Figure 1. Correlation between the mean risk and the variables gender, age, history of falling and psychomotor agitation

Discussion

It is important for every health organisation to use scales for assessing the risk of falling which are quick to apply, reliable, and valid, with a significant level of agreement, developed in contexts similar to the ones under analysis, and which make it possible to identify patients at risk and establish interventions (Healy & Scobie, 2007; Morse, 2009; Oliver et al., 2004; Perell et al., 2001). These scales should be used as an integral part of the organisation's care quality assurance policy. The non-validated scale used in the units where the study was conducted was significantly similar to the version which is now being validated.

The scale was more frequently applied in medical-surgical units, which were also more prevalent in the original study of Morse (2009). Of the patients who were part of Morse's study, 77.5% were above 65 years of age, with approximately 75% of falls occurring after this age (Morse, 2009). These patients were more at risk (Almeida, Abreu, & Mendes, 2010) and, therefore, 46.3% of them obtained high fall risk scores. The most common reason for hospitalisation was surgery. These patients had a higher fall risk in their postoperative period as sometimes they required ambulatory aid (Morse, 2009) and took sedating drugs to control the pain which made them more prone to falling.

The greatest differences in patient assessment were found in the item *gait/transferring*, which explains

why the scale should always be followed by an interpretation of the score obtained in each item in order to homogenise patient assessment criteria (Morse, 2009). In this item, the doubts were mainly related to patients who used a wheelchair, in which case the patient was assessed based on the way he/she transferred from the wheelchair to the bed. For scoring purposes, this process is considered normal if the patient experiences no difficulties (Morse, 2009). The average time for completion of the risk assessment scale was in line with the one described by the scale's author (Morse et al., 1989; Morse, 2009). The nurses who participated in the study considered it to be easily completed.

This article described the process that was followed to culturally adapt the MFS into Portuguese for assessing the risk of falling. Its reliability, validity and interrater agreement were also confirmed, as well as its relationship with other measuring instruments. Despite being a scale that has long been frequently used in Portuguese health care organisations (Soares & Almeida, 2008), as far as we know, this was the first time that it was validated into Portuguese.

Reliability was tested through the level of agreement between the scores independently provided by three nurses. This level of agreement ranged from 0.615 to 0.964 and the corresponding interclass correlation coefficient was 0.838. Thus, there is a good interrater agreement regarding the use of the scale (Kramer & Feinstein, 1981; Terwee et al., 2007).

The clinical review was carried out by a nursing expert and face validity was assured by a panel of experts. Criterion validity was demonstrated by significant correlations between the answers to relevant questions of the MFS and the answers in the Glasgow Coma Scale and the Barthel Index. The question concerning the mental status in the MFS was sensitive to the dimension *verbal response* and the total index of Glasgow. On the other hand, the MFS questions regarding the concept of mobility and the activities of daily living were related with the similar items of the Barthel Index.

Construct validity was also confirmed through the evidence of increased risk of falling associated with more advanced ages, history of falling (Oliver et al., 2004), psychomotor agitation (Perell et al., 2001) and the prescription of sedatives (Leipzig et al., 1999a; Leipzig et al., 1999b). Despite the evidence of an increased frequency of falls among men in other studies (Almeida et al., 2010), in the present study, being male had no influence in assessing the risk of falling. Based on this, we raise the hypothesis that, once the other variables are controlled, these two indicators may represent different concepts.

However, due to ethical issues, some types of validation could not be performed. For example, at present, there is a perfectly justified tendency to eliminate the patients' fall risk in health care organisations (Oliver et al., 2007). For this reason, the levels of risk that should lead to the implementation of fall prevention strategies are being defined and used in an increasingly conservative manner (Morse, 2009), thus somehow impeding the assessment of the scales' sensitivity and specificity. This has, therefore, a beneficial effect on the patient, because, in general, the worst case scenario is the implementation of potentially unnecessary prevention initiatives in health care provision.

Conclusion

In conclusion, based on the methodology followed and in line with our results, the Portuguese version of the MFS is semantically equivalent to the original version, thus leading to good levels of reliability and acceptable levels of validity. Its use is, therefore, recommended for the provision of hospital care in Portugal. It can be obtained by consulting the

Repositório de Instrumentos de Medição e Avaliação em Saúde (RIMAS) at <http://www.uc.pt/org/ceisuc/RIMAS/Lista/Instrumentos/MFS>.

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