Evaluation of the Morse Fall Scale in hospitalised patients

Sir—Several risk factors associated with falls in hospitalised patients have been identified [1, 2]. Although a substantial number of assessment instruments for identifying hospitalised patients at risk of falling exists [3], their generalisability is limited [4] because only a few [2, 5] have been tested in settings other than those in which they were originally developed. The Morse Fall Scale (MFS) has been evaluated in different hospital settings [6–9] and has been used in a variety of patient populations [10–16]. In search of an appropriate tool to identify admitting patients for risk of falling, the MFS appears to be most elaborate in view of its extensive development and testing in different hospital populations compared with others [3, 4]. Its easy application in clinical practice supported this choice.

However, no investigation to date has reported results of different cut-off scores of the scale. This study aimed to evaluate the diagnostic value of different MFS cut-offs to determine which score would be most useful in identifying in-hospital patients at risk of falls.

Methods

This prospective cohort study utilised baseline data collected during a four-month falls intervention study performed at two units in the department of internal medicine of a 300-bed urban public hospital in Switzerland. The data were collected on consecutively admitted adult patients (18 years and older, >48 hours in hospital) who presented with a wide range of medical conditions.

Because the study hospital is situated in the German-speaking part of Switzerland, the MFS was translated into German (MFS-G) and piloted with six registered nurses to determine their understanding of wording of items. Interrater reliability was examined and the level of agreement was 84% ($K = 0.68$). The scale consists of six items reflecting risk factors of falling such as: (i) history of falling, (ii) secondary diagnosis, (iii) ambulatory aids, (iv) intravenous therapy, (v) type of gait and (vi) mental status. The total score ranges between 0 and 125 [17, 18]. For further details of the scale, please see Appendix 1 in the supplementary data on the journal website (http://www.ageing.oxfordjournals. org/).

All registered nurses on the designated study units received a 30-minute group instruction on the use of the MFS-G as part of the implementation of the in-hospital fall risk screening programme. The primary nurses completed the MFS-G for each newly hospitalised patient within 24 hours of admission. Patient falls during hospitalisation were registered with a standardised fall incident report form that had been implemented earlier in this hospital [19].

A fall was defined as 'an incident in which a patient suddenly and involuntarily came to rest upon the ground or surface' [20]. Patient demographics and clinical characteristics (i.e. gender, age, length of stay and medical diagnosis) were extracted from the hospital administrative patient data base. The study was approved by the local ethics committee. Descriptive statistics such as frequencies, per cent as well as mean and standard deviations were calculated for demographic and clinical characteristics of the patients.

The diagnostic value of the MFS-G scores ranging from 20 to 70 was explored using receiver operating characteristic (ROC) curves, with an area under the curve (AUC) analysis based on admission MFS-G scores, and using patients who fell while hospitalised as the 'gold standard'. Sensitivity analysis—including specificity, positive predictive value (PPV) and negative predictive value (NPV) and accuracy—was performed for the different cut-off scores of the MFS-G. Chi square statistics were calculated for the estimation of risk of falling with odd ratios and 95% confidence intervals. All data were analysed with SPSS for Windows, version 12.0 (SPSS Inc., Chicago, IL).

Results

A total of 386 patients (female: 59.6%) with a mean age of 70.3 (SD: 18.5) years, and a mean length of stay of 11.3 (SD: 8.9) days were included in the study. Forty-seven (12.2%) patients experienced a total of 69 falls. For patient demographics, clinical characteristics including primary medical diagnosis and risk factors for falls (MFS-G items), please see Appendix 2 in the supplementary data on the journal website (http://www.ageing.oxfordjournals. org/).

The percentage of the patients identified as at risk of falling at admission varied with the MFS-G cut-off scores used and ranged from 89.4% (cut-off score: 20 points) to 20.7% (cut-off score: 70 points). According to the different cut-off scores, the sensitivity ranged from 91.5 to 38.3%, the specificity from 81.7 to 10.9%, the PPVs from 12.5 to 22.5% and the NPVs from 90.2 to 95.7% (Table 1). High false positive rates (i.e. patients who were classified as at risk of falling but did not fall) ranging from 87.5% (cut-off score: 20 points) to 75.9% (cut-off score: 60 points) were observed.

The area under the ROC curve ranged from 0.512 to 0.701, and the accuracy of the MFS-G ranged from 20.7 to 76.4% (Table 1). The most optimal cut-off point for the MFS-G was found to be 55, which showed a fairly good sensitivity of 74.5% (95% CI = 60.5–84.7%), an acceptable specificity of 65.8% (95% CI = 60.1–70.6%) and a high NPV (94.9%), with an acceptable accuracy of 66.8%. The ROC curve with an arrow indicating the highest peak with the cut-off of 55 points for the MFS-G is demonstrated in Figure 1. With a cut-off score of 55 points, 23.2% of the patients were screened positive and presented a relative odds ratio of 5.6 (95% CI = 2.8–11.2) for falling.

Discussion

This study constitutes a prospective test of the sensitivity, specificity and predictive value of the MFS-G in hospitalised patients. The 12.2% proportion of patients who fell in the present study lies between rates reported in previous studies of 15.7, 29.6 [6, 9], 5 and 4% [7, 21]. The variation in fall rates may reflect the different types of settings, sample sizes, patient characteristics and reporting practices. The MFS-G demonstrated moderate ability to predict patients' risk of falling using a cut-off score of 55 points as evidenced by an AUC of 0.701 in a sample of internal medicine patients.

Table 1. Predictive validity of MFS-G cut-off scores at admission (n = 386)

Cut-off scores	20	25	35	45	50	55	60	65	70
Sensitivity	91.5%	91.5%	91.5%	80.9%	80.9%	74.5%	68.1%	44.7%	38.3%
Specificity	10.9%	13.9%	16.5%	53.4%	58.7%	65.8%	70.2%	79.4%	81.7%
PPV[a]	12.5%	12.8%	13.2%	19.4%	21.3%	23.2%	24.1%	23.1%	22.5%
NPV[b]	90.2%	92.2%	93.3%	95.3%	95.7%	94.9%	94.1%	91.2%	90.5%
Accuracy	20.7%	23.3%	25.6%	56.7%	61.4%	66.8%	69.9%	75.1%	76.4%
AUC[c]	0.512	0.527	0.540	0.671	0.698	0.701	0.691	0.620	0.600

[a]Positive predictive value
[b]Negative predictive value
[c]Area under the ROC curve

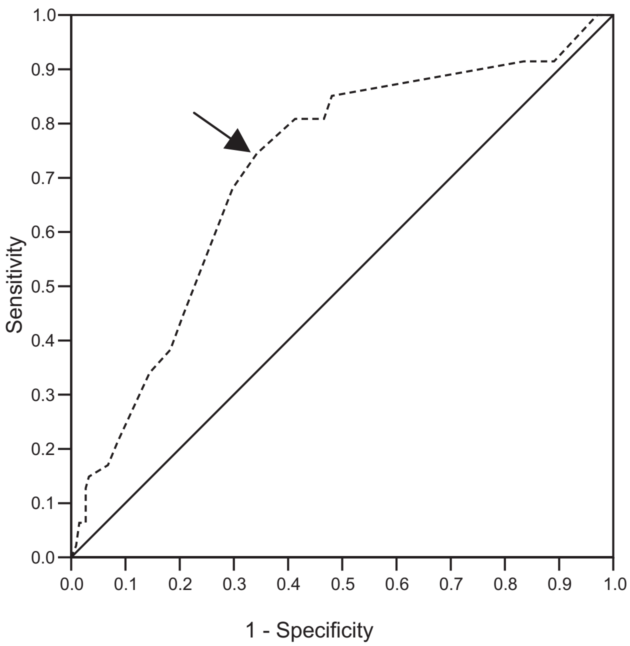

Figure 1. ROC curve with AUC of the MFS-G (n = 386). The arrow indicates the highest peak with the cut-off of 55 points.

Using the originally identified cut-off score of 45 points, only 26% patients in another study [21] were identified as being at risk of falling, whereas the same cut-off score identified 51% patients as being at risk of falling in the present study. This difference may be explained by the heterogeneity of the other sample, with patients enrolled from acute, rehabilitation and long-term care units, whereas the present study may reflect a more homogenous sample in relation to fall risk factors despite a variety of medical diagnoses. Additionally, in the original prospective study [21], the fall risk status of the patients was assessed at different points of time during their hospital stay, whereas in the present study all patients were screened for risk of falling at admission. This and the prospective follow-up during the patient's hospital stay allowed calculation of the diagnostic value of the MFS-G in relation to its predictive power.

Only one other study [9] scored patients at admission and performed ROC analysis. In that study, an MFS cut-off score of 45 points identified 75% of the patients as at risk of falling with a false positive rate of 82%. The same cut-off in the present study resulted in a false positive rate of 81%, but decreased slightly to 77% with a cut-off of 55 points. O'Connell and Myers [9] concluded, based on an AUC of 0.621, that the MFS had low ability to discriminate patients who fell and those who did not fall. However, the high positive rate may reflect a limitation in the present study because the effects of fall interventions subsequently implemented with some of the patients identified as being at risk of falling were not considered. Furthermore, the performance of falls incident reporting may be inflated by virtue of the study being conducted (Hawthorne effect). Finally, changes in the patient's health condition which may have altered risk factors for falls were not considered. Although the high NPVs (e.g. 95% of the non-falling patients were not at risk of falling) may give appropriate reassurance for patients with low risk of falling, the scale seems to be of limited operational value because the PPV is only between 12 and 24%. We therefore recommend that the MFS undergo local validation to determine the best cut-off score for a given setting before it is used clinically. Screening patients for risk of falling should lead to more targeted assessment and modification of risk factors using multifactorial interventions [22, 23]. However, because the effectiveness of hospital fall prevention programmes that incorporate fall risk assessment leads to a 25% or less reduction in fall rates [24], the idea of looking at reversible risk factors in all patients and reassessing their risk following a fall may be an appropriate approach [2].

Key point

- The MFS should be used to screen hospitalised patients at risk of falling only after local validation to determine best cut-off scores in a given setting.

Acknowledgement

The authors thank Prof. Kathy Dracup and Prof. Sandie Engberg for editing the manuscript.

Conflicts of interest

The authors have no conflicts of interest to declare.

R. Schwendimann[1,2]*, S. De Geest[1,3] K. Milisen[3]
[1]*Institute of Nursing Science, University of Basel, Basel, Switzerland*

[2]Stadtspital Waid, Zurich, Switzerland
[3]Center for Health Services and Nursing Research, Catholic University of Leuven, Leuven, Belgium
*To whom correspondence should be addressed:
rene.schwendimann@unibas.ch

References

1. Evans D, Hodgkinson B, Lambert L, Wood J. Falls risk factors in the hospital setting: a systematic review. Int J Nurs Prac 2001; 7 (1): 38–45.
2. Oliver D, Daly F, Martin FC, McMurdo ME. Risk factors and risk assessment tools for falls in hospital in-patients: a systematic review. Age Ageing 2004; 33 (2): 122–30.
3. Perell KL, Nelson A, Goldman RL, Luther SL, Prieto-Lewis N, Rubenstein LZ. Fall risk assessment measures: an analytic review. J Gerontol 2001; 56 (12): M761–6.
4. Myers H. Hospital fall risk assessment tools: a critique of the literature. Int J Nurs Prac 2003; 9 (4): 223–35.
5. Morse JM. Preventing Patient Falls, 1st edition. Thousand Oaks, California: SAGE Publications, Inc., 1997.
6. Eagle DJ, Salama S, Whitman D, Evans LA, Ho E, Olde J. Comparison of three instruments in predicting accidental falls in selected inpatients in a general teaching hospital. J Gerontol Nurs 1999; 25 (7): 40–5.
7. McCollam ME. Evaluation and implementation of a research-based falls assessment innovation. Nurs Clin North Am 1995; 30 (3): 507–14.
8. McFarlane-Kolb H. Falls risk assessment, multitargeted interventions and the impact on hospital falls. Int J Nurs Prac 2004; 10 (5): 199–206.
9. O'Connell B, Myers H. The sensitivity and specificity of the Morse Fall Scale in an acute care setting. J Clin Nurs 2002; 11 (1): 134–6.
10. Barnett K. Reducing patient falls in an acute general hospital. Foundation of Nursing Studies Dissemination Series 2002; 1 (1).
11. Camicioli R, Licis L. Motor impairment predicts falls in specialized Alzheimer care units. Alzheimer Dis Assoc Disord 2004; 18 (4): 214–18.
12. Cheng GYC, S. Fall prevention. In: 3rd Australasian Joanna Briggs Institute Colloquium for Evidence Based Nursing and Midwifery: 2002; Auckland, New Zealand: Contemporary Nurse, 2002: 61.
13. Lai KCKYS, Wong KST. Validation of the Cantonese version of the Morse Fall Scale. In: 11 Annual Congress of the Hong Kong Association of Gerontology: 2003, Hong Kong, 2003.
14. Ledsham RBJ, Beardsall A. Implementing a fall risk assessment strategy for older people: issues and outcomes. Clin Govern Bull 2002; 3 (3): 2–4.
15. McCarter-Bayer A, Bayer F, Hall K. Preventing falls in acute care: an innovative approach. J Gerontol Nurs 2005; 31 (3): 25–33.
16. Weber H. Pflegeexpertinnen helfen Stürze verhindern. In: Kantonsspital Luzern Newsletter, 2003: 3.
17. Morse JM. Computerized evaluation of a scale to identify the fall-prone patient. Can J Public Health 1986; 77 (Suppl. 1): 21–5.
18. Morse JM, Prowse MD, Morrow N, Federspeil G. A retrospective analysis of patient falls. Can J Public Health 1985; 76 (2): 116–18.
19. Schwendimann R. [Frequency and circumstances of falls in acute care hospitals: a pilot study]. Pflege 1998; 11 (6): 335–41.
20. Gibson MA, RO, Isaacs B, Radebaugh T, Worm-Petersen J. The prevention of falls in later life. A report of the Kellogg International Work Group on the Prevention of Falls by the Elderly. Dan Med Bull 1987; 34 (Suppl. 4): 1–24.
21. Morse JM, Black C, Oberle K, Donahue P. A prospective study to identify the fall-prone patient. Soc Sci Med 1989; 28 (1): 81–6.
22. Haines TP, Bennell KL, Osborne RH, Hill KD. Effectiveness of targeted falls prevention programme in subacute hospital setting: randomised controlled trial. Br Med J 2004; 328 (7441): 676.
23. Healey F, Monro A, Cockram A, Adams V, Heseltine D. Using targeted risk factor reduction to prevent falls in older in-patients: a randomised controlled trial. Age Ageing 2004; 33 (4): 390–5.
24. Oliver D, Hopper A, Seed P. Do hospital fall prevention programs work? A systematic review. J Am Geriatr Soc 2000; 48 (12): 1679–89.

doi:10.1093/ageing/afj066
Published electronically 9 March 2006

NHS continuing care: reliable decisions?

SIR—Decisions denying free National Health Service (NHS) continuing health care have been reversed by the Health Service Ombudsman from 1994 [1]. From 1996, health authorities published their individual criteria governing eligibility for continuing NHS health care [2]. Concern that criteria were too restrictive led to further guidance [3]. The 'Coughlan case' [4] and others reviewed by the Ombudsman [5] revealed people who had been wrongly denied NHS care. Restitution followed, reimbursing individuals or their estates if care had been wrongly denied.

Currently, Primary Care Trusts (PCTs) convene panels of senior staff (doctor, nurse, therapist, social worker) to determine eligibility using their Strategic Health Authority (StHA) criteria. Rejected applicants can appeal and another panel may reverse the decision.

The appeals system, however, does not indicate the level of inconsistency amongst panels. To our knowledge, this point had not been explored previously by presenting the same case to panels applying identical criteria. Here we describe a small audit undertaken during 2004 with the support of the Continuing Care Steering Group of the Norfolk, Suffolk and Cambridgeshire StHA.

Audit standard

The standard was that StHA panels should reach consistent decisions when determining eligibility for continuing NHS health care.

Method

The authors and the StHA designated officer for continuing care examined 110 completed restitution cases and selected 10 to reflect the range of conditions frequently giving rise to applications. The conditions were chronic and usually progressive. The individuals were likely to need frequent attention because of unpredictable health need, or management of challenging behaviour, characteristics often demanded by the eligibility criteria. The aetiologies were dementia, stroke