Falls risk prediction tools for hospital inpatients: do they work?

Falls prediction tools do not work well and falls prevention requires a wide range of interventions

**AUTHORS** David Oliver, FRCP, MD, is consultant physician, Royal Berkshire NHS Foundation Trust, Reading; Frances Healey, BSc, RMM, RN, is clinical reviewer, National Patient Safety Agency, London.


A fall is the most reported safety incident in inpatients and occurs in all adult clinical areas. There is growing interest in prevention strategies and, as part of this, in risk assessment tools. These may be useful if the aim is to flag up common risk factors or causes of falls and prompt interventions that are actually delivered. Tools that claim to predict patients’ risk of falling as ‘high’ or ‘low’ do not work well and may provide false reassurance that ‘something is being done’. Falls prevention should focus on a wider range of actions at the level of patients and across organisations.

Accidental falls in inpatients account for 30–40% of reported safety incidents (National Patient Safety Agency, 2007). They occur at a frequency of 4–14 falls per 1,000 bed-days, which equates to about 10 falls per month on a 28-bed ward (Oliver et al, 2007a).

According to the NPSA (2007), more than 200,000 falls were reported in hospitals in England and Wales in 2005–2006. However, safety incidents in hospitals in general and falls in particular are generally under-reported, so this figure represents an underestimation (NPSA, 2007; Shorr et al, 2007).

Falls in hospital lead to injury in about 30% of cases, with 1–5% leading to serious injury (Healey et al, 2008). As they occur predominantly in older people with frailty or multiple health problems, even minor injuries may lead to impaired rehabilitation, loss of confidence, fear of falling and a longer stay, and are a major factor in patients moving to care homes (Oliver, 2008b).

Patients’ families often perceive falls to indicate a failure in the duty of care. This can be unfair, as many falls cannot be prevented and are a feature of underlying medical problems or frailty. They are frequently cited in complaints and have been the subject of over 600 negligence claims via the NHS Litigation Authority in the past 10 years (Oliver et al, 2008a).

Some trusts have begun to look at numbers of falls as an indicator of the quality of nursing care. This could be counterproductive if it reduces reporting of falls, singles out wards specialising in patients who are particularly vulnerable to falling, or implies that falls prevention is solely a nursing issue.

Research evidence suggests that falls prevention programmes may take a year or more to take effect and may reduce rates by an average of only around 20% (Cameron et al, 2009), with the most successful reducing rates by 30–40% (Von Renteln-Kruse et al, 2007; Fonda et al, 2006). This suggests that many falls cannot be prevented.

Where the aim of care is to establish or maintain independence, efforts to prevent falls must not delay rehabilitation or take precedence over respect for the autonomy of patients. There has been some concern in the US that contracts that withhold Medicare reimbursement for whole episodes of care if a patient falls could penalise hospitals for events that may be inevitable, and this leads to perverse incentives to restrain patients routinely (Pear, 2007). Worryingly, similar action was proposed recently for Payment by Results by a commentator in HSJ (Stevens, 2008).

**WHY DO FALLS HAPPEN?** Falls often result from interacting factors that will be different for each patient. They are rarely solely due to environmental hazards but instead are nearly always

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**IMPLICATIONS FOR PRACTICE**

- Numerical risk prediction tools are not a vital part of falls prevention in hospitals – routine screening for modifiable falls risk factors such as poor mobility, confusion, sedative medication, or continence problems may be more effective.
- If you do use a numerical risk prediction tool, know its limitations – some patients who are scored at low risk of falling will fall, and most patients scored at high risk will not fall.
- Identifying risk factors is pointless unless interventions to reduce or manage them are planned, implemented and evaluated.
- One size does not fit all – patients need interventions targeted at their individual risk factors, which will vary.
- Falls can be an important signal of deteriorating physical illness – always consider this as well as checking for injuries after a fall.
- Falls prevention is a multidisciplinary issue – nurses need to work with estates and facilities staff, medical colleagues, therapists, pharmacists and hotel services.

**BOX 1. COMMON RISK FACTORS**

- Muscle weakness
- Postural instability
- Previous fall
- Confusion (delirium or dementia)
- Visual impairment
- Prescribed medicines (especially centrally sedating drugs)
- (Hartikainen et al, 2007)
- Urinary frequency or incontinence
- Agitation
- Environmental hazards
The result of an interplay between factors related to the individual (see Box 1). They often indicate signs of an underlying condition (Oliver, 2007b; 2007c) or may be the result of illness, a drug side-effect or a loss in physical ability.

This means that a fall should not simply trigger completion of a form to exclude injury but involve an assessment of medical, functional and environmental reasons for the fall and an interdisciplinary care plan to reduce the risk of further falls or injuries (NPfSA, 2007).

The patient population in acute hospitals, community rehabilitation units and mental health units is getting older, so patients with these risk factors can be found in most clinical settings, not just in those caring for older people. All staff should therefore understand why falls occur and how to prevent them.

**RISK ASSESSMENT TOOLS**

It may seem attractive to adopt falls risk assessment tools. However, there are serious issues around their use in general, and around numerical falls risk assessment tools – that aim to predict which patients are at a high risk of falling – in particular. Tools can give false reassurance to staff and fail to direct falls prevention efforts effectively.

However, assessment tools are widely used in health care and can be useful.

**RISK ASSESSMENT AND FALLS**

The term ‘falls risk assessment tool’ is used to describe a number of types of tool (see Box 2, p20), including falls risk-factor checklists and numerical risk prediction tools that aim to predict the risk of future falls.

Successful interventions to prevent falls in hospital have often used risk-factor checklists to prompt action on risk factors. For example, the York falls care plan (NPfSA, 2007) uses a falls risk-factor checklist. These tools focus on factors that can be treated or managed, and suggest interventions for each one. A range of trials and initiatives using such checklists has reduced falls (Cameron et al, 2009; Oliver, 2008b; Von Renteln-Kruse et al, 2007; Fonda et al, 2006), suggesting that they can play an important role in falls prevention programmes.

There has been considerable interest in risk prediction tools that aim to predict risk in categorical terms (‘high’ ‘medium’ or ‘low’ risk of falling or ‘at risk of falling – yes/no’). They tend to include elements with predictive value (such as gender, age or previous fall) that cannot be modified.

The idea behind such tools is that once we can identify which patients are likely to fall, we can (somehow) intervene to prevent falls. Examples of numerical risk prediction tools used in falls prevention include STRATIFY and Morse Falls Scale (Haines et al, 2007).

It is clear why such tools are appealing. If we look at the ABCD score for patients with transient ischaemic attack (Rothwell et al, 2005), people who score 6 out of 6 have a 31.4% risk of having a full-blown stroke over the next seven days, while those scoring 0–4 have a risk of less than 1%. This creates a clear and clinically useful rationale for which patients should be prioritised for rapid investigation and primary prevention of stroke. However, we need to examine whether falls risk prediction tools can do a similar job.

To be useful, a falls prediction tool should have predictive validity. This requires four elements:

- High sensitivity – a high percentage of patients who go on to fall were predicted as being high risk, or ‘true positive’ rate;
- High specificity – a high percentage of patients who did not fall were originally predicted as being at low risk of falling, or ‘true negative’ rate;
- High positive predictive value – of all patients predicted at risk of falling, a high percentage went on to fall;
- High negative predictive value – of all patients predicted at low risk of falling, a high percentage went on to not fall.

An ideal balance between these four would lead to good total predictive accuracy of classifying fallers versus non-fallers.

A simple way of presenting how good a score is at prediction is the Youden index (Haines et al, 2007). A Youden index of 1 would represent perfect predictive accuracy and 0 represents no better accuracy than the play of chance.

These may seem to be dry academic points but they are not. If a tool has a low positive predictive value or low sensitivity, it will end up predicting most of the unit as being at a high risk and staff will target interventions poorly. If the negative predictive value and specificity are low, patients who are at risk will miss out on interventions.

In addition, tools should have:

- Ease and speed of completion;

**REFERENCES**


Descriptive tools
These measure or describe things. An example in common use is the Barthel Index (a 20-point scale looking at several activities of daily living). Such tools aim to describe a patient’s abilities or current status and are useful for measuring change in specific activities.

Diagnostic screening tools
Diagnostic screening tools are generally used to identify people who may have a condition. Examples include the abbreviated 15-point geriatric depression scale (Van Marwijk et al, 1995), where a score above 11 indicates severe depression.

Risk factor checklists
These are assessment frameworks that prompt professionals to identify common risk factors or common causes of a condition, where it could be possible to reduce harm through a plan of care for each risk factor identified. Responses are usually required as text rather than as a numerical score. Examples include nursing admission checklists on support needed for activities of daily living.

Risk prediction tools
These aim to predict the patient’s risk of sustaining a particular event, usually based on a numerical score calculated from several factors. They might be used:

- In a continuous probabilistic way – for example in case management for long-term conditions, the higher a ‘patient at risk of readmission score’, the higher the chance of emergency admission to hospital;
- In a categorical way – for example the various pressure ulcer risk tools (Pancorbo-Hildalgo et al, 2006) indicating a high, medium or low risk of developing pressure ulcers;
- As a simple ‘at risk’ or ‘not at risk’ cut off. Some tools have overlapping functions. For example, nutritional screening tools act both as a screening tool to identify existing malnutrition and as a predictive tool for future risk of malnutrition.

Few of them – the exceptions are the STRATIFY score (Oliver, 2008a) and the Morse Falls Scale (Morse et al, 1989) – have been validated in more than two settings or patient cohorts.

They are often used in settings for which they have no basis in evidence. For example, tools validated in acute hospitals are used in mental health units or nursing homes, or tools validated in community settings used in acute hospitals.

Systematic reviews looking at all risk assessment tools for falls in hospitals and care homes have shown that none of them are accurate enough to identify people at risk of falling (Haines et al, 2007; Oliver et al, 2004).

The STRATIFY score, compared with the Morse Falls Scale and Downton Falls Index on the same group of 130 UK inpatients, was the quickest to complete, the most readily completed, the least prone to error, and the most widely validated of all risk assessment tools for falls in hospital (Vassallo et al, 2005). However, it still performs only moderately well overall.

In a systematic review of nine validation studies of STRATIFY in various countries (Oliver et al, 2008b), and in a large independent validation of the Morse falls scale (Schwendimann et al, 2006), both tools were found to be reasonably useful in excluding ‘low-risk patients’. However, even negative prediction values that look good in theory can mean a large number of patients are missed. For example, the Morse falls scale has a negative prediction value of around 90% (Schwendimann et al, 2006). This sounds impressive, but means that for every 1,000 patients assessed at low risk, 100 patients will actually go on to fall.

The main problem with the tools is that they are very poor at targeting interventions at ‘high-risk’ patients. In the study of the Morse scale, only one in five ‘high-risk’ patients went on to fall (Schwendimann et al, 2006).

STRATIFY has been found to over-predict less than Morse (Oliver et al, 2008b), so might be regarded as the best. However, Haines et al (2007), in a systematic review of all hospital falls risk assessment tools, found only STRATIFY and the Morse scale had been widely validated but, even for these tools, the Youden index was only around 0.3 – that means that their ability to predict a fall is little better than chance.

EXERCISING CAUTION
Despite the superficial attractiveness of an easy-to-use tool in falls prevention, its use may prove to be misleading or detrimental to care.

Tools have rarely been compared head to head against the routine judgement of ward nurses so it is not clear what value they add.
Fonda et al, 2006). Some of the most successful fall prevention programmes in hospitals did not use risk prediction tools at all.

One size does not fit all; patients’ individual risk factors are always different. Falls reduction interventions will not be the same for a patient whose high risk results mainly from Parkinson’s disease as for a patient whose high risk relates to unpredictable ‘faints’ of cardiovascular origin.

Some falls prevention interventions are likely to benefit all patients. For example, patients with unsafe footwear need safer footwear, patients on medication with central sedative effects need assessment of whether the benefits outweigh the risks of falling, and patients with acute confusion or behavioural disturbance need to be assessed and managed.

Tools may raise awareness and focus the minds of staff on the problem but health professionals need to be far more sceptical about their strengths and weaknesses rather than rely on them unhappily.

WHAT TOOLS SHOULD BE USED?
Most of the evidence around falls prevention in hospitals and in care homes suggest that we should:

- Have a general programme of awareness raising, education and training for staff around falls in older people, their causes and common preventative strategies;
- Incorporate falls incident reporting into risk management and governance, including robust investigation and analysis of trends;
- Identify common reversible risk factors for all patients, for example postural instability, the circumstances of any previous falls, medication that may contribute to falls, and continence problems. Put in place a care plan to minimise the risk factors for each patient;
- Be pragmatic in recognising units or patient groups where all patients can reasonably be assumed to be at high risk of falls, such as all patients admitted with fractured neck of femur. Ensure they receive more detailed assessment and intervention for risk factors for falls and injury;
- Make the physical environment safer for everyone, including long-term improvement plans and rapid responses to temporary hazards such as damaged flooring;
- Use each new fall to trigger a reassessment and a revised care plan;
- Do not compromise patients’ autonomy, dignity or rehabilitation potential by excessive focus on minimising risk;
- Do not use crude falls rates (which are influenced by case mix, staffing, layout and recording practice) to judge care quality;
- Do not see falls as a solely nursing issue; many risk reduction interventions depend on actions by medical staff, therapy staff, pharmacists, and estates and facilities staff.

CONCLUSION
There is as excellent opportunity to ensure that chief executives and boards place more emphasis on falls prevention as a patient safety priority in every organisation.

In its recent round of targeted and random inspections of compliance with core standards, the Healthcare Commission used falls prevention as a focus for inspecting compliance with core standard 1a (patient safety). Falls prevention will be a key element of self-assessment of compliance for this standard during 2008–2009.

The Healthcare Commission’s approach in 2008–2009 ‘will have a new focus on outcomes and how organisations address major risks to safety. We intend to improve our assessments in areas... such as falls... In our visits to trusts, we intend not just to focus on corporate approach to these areas but also on the actions taken and outcomes’ (Healthcare Commission, 2008).

This article has been written to challenge your thinking about which tools you are using, why you are using them, and what they can and cannot do.

We need meaningful and effective strategies to minimise the chance of falls and injury without compromising other aspects of patient care.

Many falls prediction tools do not work and, even when they do, their use is no substitute for addressing the various reasons and risk factors for falls and doing something to modify them.

References


Stevens, S. (2008) Improving Payment by Results. www.HSJ.co.uk

