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Abstract

Falls in the elderly are a serious health concern and as such are an important issue for nurses. A thorough patient assessment is a key measure in fall prevention; however no universal assessment tool has been adopted. Nurses, particularly those based in the hospital setting, play a pivotal role in developing fall prevention strategies. Such strategies have the potential to improve the quality of life for at-risk elderly patients, as well as providing economic benefits to society.

The Impact of Falls

The consequences of patient falls are a serious issue both for patients and society. A fall is defined as an unexpected, involuntary loss of balance by which a person comes to rest at a lower or ground level (Commodore, 1995). The elderly population are growing in number and falling is one of the most common geriatric syndromes; up to one-third of individuals over the age of 65 fall each year with half reporting multiple falling episodes (Bludau and Lipsitz, 1997). Fall-related injury is the sixth leading cause of death in the elderly (Savage and Matheis-Kraft, 2001). For example, half of those aged over 75 years who fracture their hip as a result of a fall, die within one year (Rawskey, 1998), and of those who survive, they rarely regain complete mobility (Marotolli *et al.*, 1992). Falls are also a leading cause of head injury, the most serious being subdural haematoma (Tideiksaar, 1998).

Falls are associated with major morbidity, functional decline and increased healthcare expenditure (Tinetti *et al*, 1994). Within the hospital setting, 10% of elderly patients who have fallen die before discharge, and a clustering of falls results in increased mortality (Tideiksaar, 1998). For example, around 310,000 fractures occur each year in elderly people in the United Kingdom (Woolf and Akesson 2003). Moreover 14,000 people a year die in the UK as a result of an osteoporotic hip fracture, with up to 33% of hip fracture patients die within one year of fracture (DOH 2001).

The effects of falls extend well beyond obvious physical and direct cost. Even if falls do not cause physical injury, the psychological effect can have lasting consequences, i.e. the “post-fall syndrome” – a loss of confidence, hesitancy, with resulting loss of mobility and independence (Cannard, 1996). This can result in shame and unwillingness to admit to falls. Thus, falls are under-reported and may not in fact be remembered by the faller especially in those with cognitive impairment (Lord *et al.*, 2001). Indeed, the term ‘fall’ is now considered contentious as those who fall are perceived negatively as old, frail and dependent (DOH 2001).

Family members are also affected by falls, with issues regarding the overall safety, the ability of an elderly family member to safely remain independent and the possibility of long-term care as prime concerns. There are few studies investigating how nurses view falls in patients, but according to Fitzgibbon and Roberts (1988), nurses experience fear of blame, anxiety, guilt and distress.

Causes of Falls

The first stage in the development of a fall prevention programme is to investigate the principal causes of falls. Some falls have a single and obvious cause, but most appear to result from several factors (Suzuki *et al.*, 1997). According to Tideiksaar (1998), the causes of falls can be divided into intrinsic factors and extrinsic factors (see Box 1). The principal causes include:

Acute illness. This can put patients at risk of falling by temporarily impairing stability.

Changes in vision. Restricted visual field leads to an inability to see objects in a patient's path increasing the likelihood of falls.

Changes in balance. Gait/balance disorders have been reported to be the second most common causes of falls (Rubenstein *et al.*, 1990).

Cardiovascular changes. Impaired regulation of blood pressure can predispose elderly patients to fall.

Neurological disease. Altered thought processes resulting from dementia and depression are associated with falls, as sufferers fail to differentiate between safe and dangerous environmental conditions.

Language disorders. Impaired communication may seriously compromise the elderly as they may be unable to make their wishes known.

Medications. Polypharmacy (i.e. taking more than one drug at a time) is most commonly associated with sedative-hypnotics, antidepressants, psychotropics and antihypertensives. This is regarded as a potentially preventable and reversible risk factor (Leipzig *et al.*, 1999).

Physical environment. Nearly half of falls have been found to be bed-related and use of bedrails can increase fall risk (O’Keeffe 1996).

Many of these causes of falls are within the nurse’s sphere of responsibility, and an awareness of these causes can help to determine at-risk patients.

Assessing Patients at risk of falling

The intensity of assessment varies by target population. All older persons who are under the care of health professional (or their caregivers) should be asked at least once a year about falls. Those older persons, who have or demonstrate unsteadiness as they stand up from a chair without using their arms, walk several paces and return, require further assessment. And high-risk groups (for instance, those living in nursing homes, or persons presenting after a fall) require a comprehensive and detailed assessment (American and British Geriatric Prevention of Falls in the elderly Guidelines, 2001).

Upon admission, a thorough assessment of patients by nursing staff can no doubt aid in the identification of at-risk patients and implement intervention/prevention strategies (Kinn and Hood, 2001). Fall risk prediction and determination of fall aetiology are difficult without a comprehensive systematic approach (Tideiksaar, 1998). Using a risk factor based approach to assess older people who fall can prevent over 50% of falls (Close 2001). If a patient does fall, a history of the circumstances of the fall should be obtained, including symptoms experienced at or prior to the fall (e.g. dizziness, legs giving away, palpitations, etc.) and a description of the activity the person was engaged in, as well as previous fall occurrence. As the patient may have poor recollection of these events, reports from family, nurses, or other staff may

be helpful. Post-fall assessment tools are considered to be particularly useful in inpatient rehabilitation units, where there is a homogenous patient population (Patrick and Blodgett, 2001). An objective, systematic fall assessment is facilitated by the use of a fall assessment tool. Numerous fall assessment tools have been proposed as many institutions develop their own assessment tools (Myers 2003). These assessment tools vary in degree of intensity and length of time to complete. The following tools are just some of the many available.

Morse (1997) has developed the Morse Falls Scale consisting of 6 items (history of falling, presence of a secondary diagnosis, use of an ambulation aid, intravenous therapy, type of gait and mental status). This tool has the advantage of ease of scoring by the use of a chart audit or direct observation. This scale has high inter-rater reliability ($r = 0.96$) and sensitivity to different patient conditions and lengths of stay (Morse, 1997). However, the scale may be time consuming to complete.

Oliver et al (1997) in a case-control study investigating 21 possible risk factors identified five factors significantly associated with falls and subsequently utilised these five factors to construct a risk assessment tool (STRATIFY). This tool was found to have high sensitivity and specificity in predicting falls when tested in two elderly care units. The STRATIFY tool was tested by Papaioannou et al (2004) in a prospective cohort study with 620 patients over the age of 65 years and was found to have a very good inter-rater reliability coefficient score of 0.78, with mental status being a significant predictor of falls ($P < 0.001$).

Sweeting (1994) calculated the range and frequency of different causes of falls in the Harrogate General Hospital, UK. The aim was to assess patients once upon admission and then once thereafter. Care plans were developed according to the risk assessment score. During the 6 months before the trial, there were 77 patient falls. At the end of the trial period, the total number of falls had been reduced to 44, a decrease of 41%. Although there were no tests of validity or inter-rater reliability of the tool, the authors suggest the programme has generated a high level of awareness of “at-risk patients” among all staff dealing with elderly patients.

The Assessment for High Risk to Fall Research Instrument is a tool introduced by Spellbring (1992), and was examined in 30 patients (equal numbers of males and females). Risk areas identified included history of previous falls, mental status changes, weak or debilitated functional state, mobility deficits, communication deficits, multiple medications, urinary alterations, emotional upsets and orthostatic hypotension. Further tool development included a standardised nursing care plan incorporating risk factors and nursing interventions. The average time taken by nurses to perform this assessment was 17 minutes. Inter-rater reliability, was 90%, suggesting that it is a reliable tool in the acute care setting.

Schoenfelder (2000) used the Risk Assessment for Falls Scale II (RAFS II), a 13-item tool. Items assessed were length of time since admission, age, history of falling, balance, mental status, agitation depression, anxiety, vision, communication, medication, chronic diseases and urinary function. The scale has been shown to be 90% accurate at predicting falls (Schoenfelder, 2000), and was adopted by two Maryland hospitals. It involves a nurse education programme prior to implementation, and the nurse prepares a care plan, which is reviewed. The programme reduced fall

incidence from 9.3 to 7.3 per 1,000 patient days. This reduction is likely due to increased awareness of at-risk patients (Sullivan and Badros, 1999).

It is possible that potential multiple risk fallers may be identifiable at the time of their first fall (Gaebler, 1993). Cannard (1996), in Tullamore Hospital, Ireland developed the Fall Risk Assessment Scale for the Elderly (FRASE). The FRASE scale lists risk factors, each of which is given a weighted score and is similar to the Norton and Waterlow scales used to predict risk of developing pressure sores (Waterlow, 1985). This tool includes a care plan on the reverse of the card aimed at reducing falls. Such a tool represents an example of practice theory in nursing, as practice theory identifies explicit goals and details interventions to achieve these goals. Cannard (1996) found that the FRASE scale was effective in predicting the likelihood of falls, and since its introduction, the number of falls have been reduced by 15% and fall incidents by 22%. Identifying patients at risk, and implementing appropriate strategies have achieved this reduction. The FRASE tool was adopted by Barry *et al.* (2001) in Baltinglass hospital, also in Ireland, and nursing staff have reported it successful in increasing their awareness of the serious consequences of a fall, their knowledge of remediable risks and their ability to identify and reduce these risks.

In addition to assessment tools, certain tests have been developed which could be incorporated into such tools, as they can investigate aspects that are not examined in the assessment tool. The Functional Reach (FR) test is a quick, simple, single-task dynamic test that defines Functional Reach as "the maximal distance one can reach forward beyond arm's length, while maintaining a fixed base of support in the standing position" (Duncan *et al.*, 1990: p41). The test has high inter-rater reliability

and found to be predictive of falls in the elderly. While the FR test is a reliable tool to measure balance and instability, it is not applicable universally to every patient group, e.g. patients with dementia and restricted arm movement (Weiner *et al.*, 1993).

The Clinical Judgement (CJ) test uses an holistic approach allowing the nurse to build up a clear picture of the patient's past and current functioning, including their strengths and weaknesses (Eagle *et al.*, 1999). The CJ method has been compared to the Morse Falls Scale and Functional Reach test in terms of its usefulness in assessing fall risk (Eagle *et al.*, 1999). The results showed that the CJ method was as good at predicting falls as the other tests. The features of the CJ that had greatest predictive validity were previous falls, walking with supervision, impulsive behaviour, cognitive impairment, unwillingness to follow safety techniques, poor balance and aphasia. Therefore, this tool could be of greatest use with patients suffering from Alzheimer's Disease and following a stroke.

Patrick and Blodgett (2001) investigated patients in a rehabilitation unit and found that primary diagnosis was the only variable that significantly predicted falls, and that cerebrovascular accident (CVA) was associated with significantly more falls than any other primary diagnosis, a finding supported by Campbell *et al.* (1989). Therefore, documentation of a CVA should be an important feature of any assessment tool.

Certain features are common to all of the assessment tools described (Table 1). All tools include a fall history, whilst the majority also examine mental and mobility status, sensory deficits, medications and the presence of secondary diagnosis, suggesting that these components are universal in assessing fall risk. However, only the STRATIFY, FRASE and RAFS II tools have been examined in institutions other than those in which they originated.

Several considerations need to be made when selecting an assessment tool most appropriate for a particular setting. These include: the time required to complete, ease of use, applicability to particular settings, and validity/reliability. In addition, the homogeneity of the patients on the ward is important, as in some cases (such as a stroke rehabilitation ward) the patients may have similar characteristics, compared to a medical ward (Mitchell and Jones, 1996). The combination of an assessment tool with a care plan is an example of best practice as illustrated with the FRASE tool. Assessment protocols that accurately identify which patients would benefit most from an effective fall-prevention programme are necessary to facilitate this decision making process.

However, the use of fall assessment tools by nurses is not encouraging. Willis (1998) conducted a questionnaire survey of nurses and other health professionals in 368 healthcare centres in the UK, of whom half responded. Only 3% of respondents indicated that they used a formal risk assessment tool to identify people at risk of falling in their homes. Thus, Willis (1998) has suggested that the fall risk assessment is dependent on the skills of the healthcare worker undertaking the assessment, rather than the effectiveness of the tool itself. However, increased awareness among nurses regarding the effectiveness of a formal risk assessment has probably resulted from the publication of standard 6: Falls by the National Service Framework for Older People (DOH 2001).`

Prevention Strategies

Falls can never be completely prevented. If a unit professed to have zero falls, the methods employed to achieve this would have to be questioned, as it would suggest the imposition of unnecessary restrictions on older peoples' activity. It is difficult to establish what could be considered an acceptable rate of falls as the profile of the patient population can vary considerably between healthcare establishments. What can be said, however, is that a reduction in fall rates achieved by dignified, safe and proven methods will have a beneficial effect on patients' quality of life. By identifying risk factors and making appropriate interventions, nurses can play a vital role in preventing falls, thereby reducing injuries that may delay recovery, prolong hospitalisation and increase costs (Sullivan and Badros, 1999).

Medication Review. All drugs should be reviewed carefully in terms of their risks and benefits. Drug combinations should be monitored on a regular basis for potential drug interactions, in particular drugs that affect mobility or increase fall risk such as sedative-hypnotics and psychotropics. The nurse should teach the patient and carers about specific side effects of drugs that can cause falls and how to manage them. For example, diuretics can cause postural hypotension, so patients should be advised to get up slowly from a lying position to avoid fainting.

Gait and balance rehabilitative strategies. Patients with impaired muscular strength and altered gait and balance often benefit from low intensity leg strengthening and weight-bearing exercises, as well as gait balance and transfer training. In addition, by building patients self-confidence in performing physical activities, a fear of falling or instability may be reduced (Tideiksaar, 1998). It has been found that the introduction of a walking programme reduced the number of falls (Koroknay *et al.* 1995; Resnick and Spellbring, 2000). However, an important point to consider in any exercise programme is the large number of subjects who drop out within the first 6 months,

which can be up to 50% (Resnick and Spellbring, 2000). Successful exercise programs have consistently been over 10 weeks duration and exercise needs to be sustained for continued benefit (American and British Geriatric Prevention of Falls in the Elderly Guidelines 2001). Therefore, successful implementation of such programmes demands a strong commitment from staff and residents.

Alarms. The use of alarms as a fall preventative strategy is supported by research demonstrating that patients tend not to ask for help when getting out of bed (Barberi, 1983). Cannard (1996) incorporated into his prevention plan, the use of an ambularm (alarm is attached to the patient's leg and is activated when the patient moves from a lying to a vertical position) in high fall risk patients. Whilst these alarms might help reduce falls, it is not cost-effective to provide them for every patient.

Modifying the physical environment. Occasionally, hospitalised patients slip and fall because floor surfaces or footwear lack adequate traction. Antiskid acrylic floor wax, nonskid rugs and skid-proof strips near the bed can prevent slips. In a nursing home dementia unit, 38% of falls were attributed to slippage on urine (attributed to residents being unable to reach the toilet in time, being incontinent and then slipping in their own urine) (Meddaugh *et al.*, 1996). To remedy this, nurses should ensure that the commode is near the bed. Residents should be encouraged to wear low-heeled shoes, with good traction whilst the use of treaded slipper socks in bed reduced falls at night by 9% (Meddaugh *et al.*, 1996).

Bedrail use. Bedrails are commonly used to minimise falls from hospital beds, but paradoxically can result in more serious injury as patients may attempt to climb over them and may fall from a greater height (O'Keeffe *et al.*, 1996). Placing a pillow or rolled blanket under the mattress edge can be more effective in preventing patients from rolling out of the bed, or the at-risk patient could be nursed at floor level

(Tideiksaar, 1998). Dunn (2001) has found that when a restraint-free period was instituted in a long-term care facility, there was a significant decline in the number and seriousness of injuries. Bed rails should be used with caution and certain guidelines for their use have been developed (Everitt and Bridel-Nixon, 1997). The education of nurses has proven to be the most important factor in achieving restraint-free care. Few studies have investigated nursing attitudes towards restraint use (Ashcroft-Simpson, 1999). In a questionnaire given to nurses in a general hospital, Schott-Baer *et al.* (1995) found that nurses felt that they needed to restrain patients in order to protect them, and nurses felt bad if patients became more upset following the application of restraint.

Hip protectors. More than 90% of hip fractures in older people are related to direct trauma against a hard ground surface following a fall (Tideiksaar, 1998). A programme of providing hip protectors to reduce the incidence of hip fracture for those living in institutional care with a high background incidence of hip fracture appears to reduce the incidence of hip fractures (Parker et al 2004). Moreover, recent studies have shown that the number of fractures occurring in patients wearing hip protectors is dramatically reduced (Tracey *et al.* 1998; Chan *et al.* 2000). However, as the hip protectors need to be worn 24 hours a day, patient compliance ranges between 30 and 50% in these studies. The appliances are uncomfortable due to their weight and being made of polypropylene, which adds to the discomfort. Dementia is the most significant factor identified regarding compliance, which Chan et al (2000) suggest should be addressed in the design of protectors so that they are not so easily removed. However, this suggestion presents an ethical uncertainty. Despite improvements in design, compliance will remain the single greatest obstacle to achieving maximal benefit (O'Toole, 2002). Van Schoor et al (2003) argue that the

allocation of hip protectors to cognitively impaired persons without organized involvement of caregivers is of limited benefit and should be discouraged. Therefore, Meyer et al (2003) suggest that hip protectors should be used only when combined with an education programme for nursing staff, other caregivers and if possible, the persons who will be wearing them.

Multiple interventions. Because of the multifactorial aetiology of falls, interventions aimed at reducing multiple risk factors are more likely to be successful (Tinetti *et al.*, 1988), including risk assessment, an educational programme for staff and patients, and planning interventions to reduce falls. However, Chang et al (2004) conclude that it is not possible to indicate which components of the multifactorial interventions are the most effective. Nevertheless, Sullivan and Badros (1999) showed that such a programme successfully reduced the rate of falls and increased nurses' risk assessment practice.

Anticipatory nursing. The nurse's contribution to fall prevention is particularly important in relation to their clinical experience. Anticipatory nursing involves proactive patient care whereby staff routinely provide assistance with activities for those identified at increased risk, rather than waiting for them to ask. Brady *et al.*, (1993) used a quality improvement monitor (in a 28 bedded geriatric unit) to provide proactive nursing interventions to reduce potential falls during four peak fall times based upon patient care needs identified in the audit. Thirty minutes prior to the start of these times a staff member asked each patient if they needed assistance. These efforts, combined with staff education and enhanced awareness of environmental hazards were effective in reducing falls by 50%, supporting the belief that patients whose needs are met fall less.

Discussion and Conclusions

As the causes of falls are multifactorial, (including age, mental status, history of falls, visual impairment, medications, and poor mobility), it is of no surprise to find that these factors have been incorporated into the assessment tools that have so far been developed. A major problem is the lack of adoption of a universal assessment tool. At present, institutions tend to develop their own assessment tools that are usually only investigated in these institutions, and thus have not been independently evaluated for validity and reliability. Most assessment tools use a system of scoring the patients risk of falling. The most important features of any assessment tool are that they are easy to use, quick and that they reliably identify at-risk patients. Interestingly, in one study the use of a nurse's clinical judgement was as useful a predictor as more time-consuming assessments (Eagle *et al.*, 1999). Many of the results of the assessment interventions suggest dramatic reductions in fall occurrence. However, whether these reductions persist has not been investigated as typically the studies have a follow-up period of only a year at most. Research programmes examining the effect of fall prevention strategies should be longer in duration (e.g. 2-5 years) to evaluate whether the reductions in falls initially reported are maintained. Finally, the psychological trauma of a fall to an elderly patient should also be investigated further. The impact of falling on the quality of people's lives should not be forgotten in the current focus on risk management (Gillespie 2004).

Providing a safer patient environment can be achieved by the use of the relatively straightforward procedures discussed earlier. Furthermore, the combination of a thorough assessment and primary nursing has the potential to improve anticipatory nursing and reduce falls.

All falls in hospital wards should be documented in the Incident Book, and the causes investigated so that preventative measures can be suggested. Also, staffing patterns should be reassessed to take account the times of day when patients are most likely to fall. Most falls occur during the night and the daytime hours of 6 a.m. to 10 a.m. and 4 to 8 p.m. (Tideiksaar, 1998). The high nocturnal fall rate is probably due to older people having to go to the toilet, travelling under poor illumination and the unfamiliarity of their surroundings. The hours of peak frequency of falls during daylight hours corresponds to heightened waking activity levels. For example, Tutuarima et al. (1993) in their case-control study of 349 stroke patients, found that the greatest number of falls (53.1%) occurred in the day, at times when more staff are present, but at a time of high ward activity.

Nurses should value their role as part of an interdisciplinary team comprising doctors, physiotherapists, occupational therapists and social workers that together can produce a fall reduction programme. Education of staff is essential in changing beliefs and empowering nurses to care alternatives and Middleton *et al.* (1999) has found that nurses attending a 1-day educational seminar were able to deliver this programme in their workplace, revising policies on restraints, and modifying resident careplans.

In conclusion, the nurse (whether community or hospital based) plays a pivotal role in the prevention of falls in the elderly, either as an individual or as part of an interdisciplinary team. Proactive patient care that provides an opportunity for the nurse to use his/her clinical observation skills, when combined with the preventative measures outlined above can produce a sustained reduction in the number and severity

of falls. Such strategies can prove to be cost-effective and can dramatically reduce the physical and psychological trauma experienced by the elderly and their families.

Box 1. The causes of falls (Tideiksaar, 1998)

Intrinsic factors	<ul style="list-style-type: none">➤ Age related changes and diseases associated with vision, balance, gait, Cognition, musculoskeletal, cardiovascular and urinary systems➤ Acute diseases, e.g. syncope, cardiac arrhythmias, fever➤ Medications: Age-related changes in pharmacokinetics and pharmacodynamics, polypharmacy
Extrinsic factors	<ul style="list-style-type: none">➤ Physical Environment➤ Devices: bed side rails, mechanical restraints, walking devices➤ Footwear➤ Situational Circumstances (length of stay, time of day, number of nursing staff on duty)

Box 2: Implications for practice

- A thorough assessment that accurately identifies at-risk patients should be implemented.
- Primary nursing should be attempted wherever possible, thus improving anticipatory nursing
- Providing a safer patient environment should be paramount
- A review of patient's medication and the provision of information on the side effects of drugs, exercise, balance and gait training to improve mobility should occur regularly.
- Nurses should be educated of the dangers of falls associated with bedrail use, and the advances in fall prevention strategies
- Hip protectors should be provided to all at-risk patients
- Staffing patterns should be reassessed to take account of the times of day when patients are most likely to fall.
- Patients and families should be provided with information that can help to reduce falls.

Table 1: Components of various Assessment Tools

Item	Harrogate Assessment Plan	Assessment of High Risk to Fall	RAFS II	FRASE	MFS	STRATIFY
Fall history	+	+	+	+	+	+
Mental status	+	+	+		+	+
Mobility status	+	+		+	+	+
Sensory deficit	+	+	+	+		+
Medication	+	+	+	+		
Presence of secondary diagnosis	+		+	+	+	
Balance/gait			+	+	+	
Urinary function	+	+	+			+
Communication deficit	+	+	+			
Age			+	+		
Improper footwear		+				
Loss of loved one		+				
Gender				+		
Length of time since admission			+			
Intravenous therapy					+	

RAFS II: Risk Assessment for Falls Scale II; FRASE: Fall Risk Assessment Scale for the Elderly; MFS: Morse Falls Scale; STRATIFY: St Thomas's risk assessment tool in falling elderly inpatients.

+ = Component included in the assessment tool.

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