The contribution of environmental factors to elderly in-patient falls in acute facilities

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In-patient falls have been the biggest single category of reported hospital patient safety incidents since the 1950s. This may be due to a combination of patient-related (intrinsic) and environmental factors. Interventions have mostly followed a series of sequential steps: assessment; communication; monitoring; patient modification; and environment modification. This study explored the contribution of environmental factors in 26 reported un-witnessed patient falls using staff interviews and location mapping. It was found that the location of the fall seemed to be associated with the position of the bed rail and that very few of the patients were wearing shoes or socks at the time of the fall. In the US, hospitals may not be reimbursed for falls if they are categorised as ‘never events’ (events that should never occur).

Introduction

In-patient falls have consistently been the biggest single category of reported hospital patient safety incidents since the 1950s (Parrish and Weil, 1958). They are a significant cause of morbidity and mortality and have a high prevalence after admission to hospital (Salgado et al, 2004). The incident rate for falls is approximately three times higher in hospitals and nursing homes than in community-dwelling older people (AGS, 2001). It has been suggested that this may be due to a combination of extrinsic risk factors (relating to the environment; Hignett and Masud, 2006), for example, unfamiliar environment and wheeled furniture, combined with intrinsic risk factors (relating to the patient) such as confusion, acute illness and balance-affecting medication.

Many attempts have been made to reduce the number of incidents and fall-related injuries but there has been very little evidence of sustained success in either the incident and injury rates over the last 60 years (Healey et al, 2008; AGS, 2001). Although only a small percentage of patient falls result in death and serious injury.
they represent a serious financial, governance and resource burden in terms of on-going healthcare costs and litigation (Boushon et al, 2008). Interventions have predominantly followed a series of sequential steps: assessment, communication, monitoring (observation), modifying the patient (e.g. medication review, continence management and impact protectors), and modifying the environment (Hignett, 2010). This paper investigates the role of environmental factors in acute facilities.

**Method**

The study investigated 26 reported incidents for un-witnessed patient falls from March to September 2009 in 4 Care of the Elderly wards (n=112) in a large acute UK hospital (1,150 beds). The nurse reporting the incident was interviewed with a structured proforma (figure 1) to add factual information, for example the exact location of the fall, whether the bed rails were raised (3/4 length rails) and the type of footwear worn by the patient at the time of the fall.

The study was granted Ethical Approval from Nottingham Research Ethics Committee 1 (08/H0403/149) and Research Governance by Royal Derby Hospital (DHRD/2008/071).

- Where was the patient found?
- Was the patient injured?
- Were their bed rails up or down?
- Were they using any mobility aids (e.g. stick, frame, wheelchair)?
- Should the patient have been mobilizing independently?
- Was the patient carrying anything?
- Were there any trip hazards (prompt: footwear, type of flooring, liquid on floor)
- What was the lighting level?
- Vision correction – Did the patient use glasses, where they wearing them?
- Was the patient attached to anything e.g. catheter, drip
- How long do you think the patient was on the floor for?

**Figure 1. Interview proforma**

**Results**

The data were analysed descriptively (figure 2), and plotted on location maps for falls (figures 3 and 4).

18 patients fell from the bed (figures 3 and 4), with 5 falling from an adjacent chair or commode (3 fell in the bay or bathroom). 18 patients were found on the floor by the bed, 4 were found by their chair, 3 in the middle of the bay and 1 in the bathroom. 10 of the 18 patients falling from bed had raised bed rails; for 7 bed rails were either not applicable as they were not in bed or there was no information. Most patients had bare feet (n=17) at the time of the fall, with 8 wearing shoes, socks or slippers. 14 falls occurred under ‘good lighting’ (day light or artificial
lights), with 12 falls in poorly lit conditions (light from corridor only) usually at night (after 22.30).

Figure 2. Results from pilot case study

The data were plotted on location maps (figures 3 and 4). In the 10 cases the falls occurred from the bed when the bedrails were raised (figure 3), with the patient found on the floor at the lower end of the bed, having ‘wriggled to the bottom’ of the foot end of the bed.

Figure 3. Location map of falls from the bed with raised bed rails

In the 8 cases the falls occurred from the bed when the bedrails were not raised (figure 4). The location of the falls is less clustered than figure 3 (with raised bedrails). In 5 cases where the patient fell from a chair or a commode they were found on the floor by the head of the bed (n=4) or at the end of the bed (n=1). Three other patients were found in the middle of the bay and in the bathroom.

Discussion

There have been several interventions to facilitate the route from bed-to-bathroom. These include bringing the toilet to the bed by placing the commode adjacent to the bed, locating the patient in a bed near to toilet in multi-bed bays, and removing
obstacles from the bed-toilet pathway (Krauss et al., 2008). It has been suggested that wheeled furniture (e.g. tables, lockers) may contribute to the environmental hazards by moving unexpectedly (Tinker, 1979) but no trials were found to test this hypothesis with fixed base furniture.

Figure 4. Location map of falls from the bed with no bed rails

The use of bed rails has been discussed since the 1960s, with Fagin and Vita (1965) commenting that ‘to many conscious patients, side rails are frightening and imply dangerous illness. To others, side rails are irritating and humiliating because they emphasize the confining aspects of hospitalization.’ Bed rails have been used extensively as an intervention to manage falls (Capezuti et al., 2007; Healey et al., 2004), but there is no evidence that they prevent falls or injury (Capezuti et al., 2007).

No published literature was found about the design of hospital flooring for bare feet. Lighting has been discussed as both a barrier (floor reflections and glare) and a facilitating issue (e.g. night lighting) (Chaâbane, 2007). Källstrand-Ericson and Hildingh (2009) suggest that the hospital environment should be adapted to account for the decline in contrast sensitivity with age by using strong, contrasting colours and adequate lighting during night hours.

Conclusion

It has been suggested that changes in hospital design may affect the risk of falls (Gulwadi and Calkins, 2008) but research studies have failed to systematically evaluate environmental design interventions. The lack of high quality research on physical environment interventions might be, as Oliver et al. (2007) suggest due to the ‘inherent logistic difficulties in performing or interpreting studies in care homes or hospitals associated with population, setting, design, and outcome measurement’.

In the US falls resulting in patient death or serious disability while being cared for in a healthcare facility are included in the 28 ‘never event’ categories by the National Quality Forum (2007). This is likely to raise the priority for finding effective interventions as it is an emerging belief that hospitals may not be reimbursed for events that should never occur, this would include falls. Making environmental changes can be very expensive. If the research evidence is not available to show that different layouts, flooring, lighting and technology can reduce both the incidents and
injuries associated with elderly in-patient falls at the time of construction then retrofitting is unlikely to happen.

References


Hignett, S. 2010, Technology and Building Design initiatives in interventions to reduce the incidence and injuries of Elderly In-Patient Falls, *Health Environments Research and Design Journal* (in press)


