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Chapter 12 Preventing Falls

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[UK English spelling to be retained]

12.1 Overview

The early chapters in this book described the mechanisms of human gait, including discussion of falls in different circumstances. It was explained that walking is a complex feat of biological engineering, involving postures which are inherently unstable. Separate attention was given to our visual sense, in view of the significance of this for both monitoring the environment and maintaining balance. Processes involved in slipping and tripping have been described, together with an account of the interaction between footwear and flooring and the manner in which this is affected by the presence of substances such as liquids and ice.

The two chapters examining steps and stairs and falls among older people considered situations where falls are a particular problem. Steps and stairs are common features of the built environment and are a concern because falls in these locations lead to injuries of greater severity than those from falls on the level. Older people are particularly prone to falling due to changing abilities with ageing, and take longer to recover than younger adults and children.

Approaches to fall investigation have been reviewed from both a research and practical perspective. A range of methods, from epidemiological analysis of injury databases, through

to investigation of individual incidents, are of value in understanding factors involved in falls among different groups and in different settings. Separately, the different methods described each have their limitations but, used in combination, they allow a detailed picture of causation to be established. Fall investigation as part of risk management practices needs to consider prevailing attitudes held in the wider community towards falls. Often these reflect a view that falls are either inevitable or in large part due to the recklessness of those involved. Structured investigation of individual falls contributes to organisational learning, as well as the identification of particular hazards in an incident that ought to be dealt with.

The series of case studies presented in chapters 8 to 11 elaborated on the variety of circumstances in which falls occur and approaches to their prevention, drawing upon practical examples. These encompassed factors involved in fall causation of both environmental and behavioural origin.

12.2 The politics of falls

Readers may have discerned from the contributions to this book a sense of the ‘politics’ surrounding falls and the effects of this on the direction research and preventative activities have taken. Although this book has emphasised the need for a multidisciplinary approach to understanding and preventing falls, including consideration of the wider circumstances affecting exposure to risk of falling, mention was made in chapter 1 of the distinct and largely independent attention given to falls by practitioners, researchers and policy makers from different backgrounds. Falls in the workplace and falls among older people are contrasting examples in this respect.

In the workplace, greatest effort seems to have been devoted to developing methods for the measurement of slip-resistance in different situations and to achieving technological improvements with flooring and footwear. Less attention has been given to the many other factors involved in workplace falls, especially those intrinsic to the person, such as health, fitness, strength, balance and coordination and influences upon these. Moreover, there have been surprisingly few intervention trials of any rigour, aimed at establishing what works and what does not for preventing falls in the workplace. At present, there is a notable absence of objective evidence in this respect. This is in contrast to fall prevention among older people, where a significant number of intervention trials have now been undertaken, with the findings from these individual trials then collated and subjected to systematic review.

Notwithstanding the efforts directed at evaluating intervention approaches, the focus of fall prevention among older people has perhaps been narrower than desirable. Efforts to address the serious problem of falls among this group have, understandably enough, been led by the medical community, bringing a medical perspective to the issue. Indeed, the increasing emphasis on evidence-based, preventative medicine over recent years is at least partly responsible for the concerted attention that the problem of falls among older people is now receiving. However, medical practitioners and researchers perhaps have a tendency to view falling as an illness, with an aetiology predominantly located with the person. An emphasis on medical assessment and treatment, with a primary focus on healing and avoiding reoccurrence, may skew attention away from efforts aimed at preventing initial falls happening in the first place.

It is argued here that in the case of both falls in the workplace and falls among older people, greater recognition is desirable of the wide-ranging precursors to falls, with similarly wide-

ranging approaches to prevention. It is also surprising to those familiar with user-centred, participative approaches to addressing problems involving people, the extent to which individuals appear to be viewed as passive recipients of fall prevention initiatives. Efforts aimed at reducing falls must recognise that their success will be influenced materially by the knowledge, attitudes and beliefs of those towards whom fall prevention measures are directed, determining acceptance and resulting behaviour.

Another manifestation of the politics of falls may be seen in the high profile of flooring and footwear manufacturers, eager to secure commercial benefit for their products. This applies similarly to manufacturers and retailers of floor cleaning agents, cleaning equipment and treatments to increase slip-resistance. When it comes to methods and devices for measuring the frictional properties of flooring, discussion has been equally intense, with large numbers of alternative techniques proposed over the last 50 years. As yet, there are still improvements to be made in providing a slipperiness measurement method that better accounts for the dynamic processes involved in the interaction between foot and floor, while being suited to practical use. There is considerable proprietary advantage to be gained for developers of a product or method adopted for widespread use. One outlet for these various interests is through participation and lobbying of the committees working on building standards and regulations. Current specifications for the dimensions of steps and stairs, for example, are in part a compromise between those arguing for the needs of the user and builders concerned with construction costs.

On another front, increased awareness of falls as a serious problem has been accompanied by increased levels of litigation from fall victims, seeking compensation for their injuries. The defendants in such cases, employers and those responsible for facilities used by the public, are

increasingly exposed if they are unable to demonstrate that they have taken appropriate measures to prevent falls occurring. Individual claims present interesting questions on the detailed dynamics of falling, the relationship between these and injury outcomes and the extent to which an individual's actions might have been contributory. In each of these respects, there is more to be learnt about falls but, notwithstanding this, substantial compensation awards have been made to fall victims who have had the misfortune to experience serious injury. A positive outcome of such litigation has been the extent to which it has acted as a forceful stimulus for more widespread implementation of safety measures aimed at fall prevention.

12.3 Understanding falls

It has been discussed throughout this book how falls arise from a combination of environmental and personal factors which, in turn, are affected by individual behaviour and organisational influences, figure 12.1. Hazards present in the environment, such as slippery flooring or an uneven floor surface, interact with the ability of individuals to detect such hazards, take avoiding action, and to recover balance should this be disturbed. Detection, avoidance and balance recovery are affected by individual health, fitness and alertness, with these influenced by the extent to which people exercise or suffer from illness and fatigue. Psychotropic medication, in widespread use for the treatment of conditions such as anxiety, depression and insomnia, can affect coordination and concentration. Alcohol has similar effects in this respect that are readily apparent.

figure 12.1 about here

The extent to which fall hazards in the environment give rise to problems is affected by individual behaviour. An individual, in a hurry, carrying a heavy or bulky object, or giving their attention to something else (eg using a mobile phone), may be less likely to notice a slippery surface or a low step. Awkward or bulky loads may impede vision and make it more difficult to recover balance in the event of a slip or trip. Other behavioural influences arise from the choices individuals make in terms of using appropriate footwear, use of lighting, and, where necessary, use of correct spectacles. In some circumstances, individuals might act in a reckless fashion, venturing into unsafe situations. Examples commonly involved in falls from height are the use of steps and ladders in inappropriate circumstances and workers venturing onto fragile roofs. Such behaviour is affected by the knowledge of individuals, their appreciation of risk and other factors which motivate them.

Without the presence of hazards in the environment, the majority of falls would not occur. The existence of hazards depends on the design of buildings and walking routes; specification of flooring surfaces, steps, stairs and other means of access to height; provision of lighting; and then the adequacy with which each of these is installed. These factors are affected by custom and practice, legislation, standards and building codes, as well as the extent to which the latter are regulated and enforced. Organisational influences from those providing services to the public and employers bear upon individuals, the activities they perform and the conditions in which these are undertaken. Practices at community level with regard to health promotion and medical care have an effect on the health and fitness of individuals, especially older people. Those responsible for the built environment have an obligation to ensure that areas are cleaned and maintained in satisfactory condition. Employers have a duty to provide footwear and work equipment appropriate to a particular workplace. Organisational policies affect each of these, as does the education, training and supervision that are in place.

The consequences of a fall can include both physical injury and psychological distress, with wide ranging outcomes. The severity of injuries depends upon, among other things, the vertical distance through which a fall occurs and the hardness of the surface on which the person lands. The outcome may range from bruising and grazes, of little long term effect, through to fractures requiring a long period to heal, leaving a person with substantially reduced mobility and function in the interim. Falls can also lead to persistent back problems or, in the worst instances of spinal injury, quadriplegia may result. A blow to the head from falling, if not fatal, may lead to serious brain injury. In the worst cases, an unexpected fall can be a life changing event, with severe repercussions for both the individual and those around them. Among older people, even a non-injurious fall can leave individuals with a loss of confidence to the extent that restricted activity ensues. Thus, the result of a fall can vary from being of little consequence through to being extremely serious.

12.4 Preventing falls

The multifaceted problem of falls requires a multifactorial approach to prevention. This can be structured as having three generic components: (i) primary prevention, (ii) residual risk reduction and (iii) measures to maximise individual capability, table 12.1. We have not sought to separate discussion of fall prevention for different groups and differing circumstances, on the basis that conventional boundaries adopted between different categories of fall and fallers conceals a considerable overlap of issues. Older workers, for example, face both the hazards present in the workplace, along with gradual onset of the changes accompanying ageing. Falls from height may arise from similar antecedents to those that cause falls on the level and on steps and stairs.

table 12.1 about here

12.4.1 Primary prevention

Primary prevention of falls aims to eliminate fall hazards at source, through the design of the built environment and work/activity systems. Flooring should offer appropriate slip resistance for the different conditions to which it will be subjected. Similarly, walkways and walking areas should be designed and constructed to avoid trip hazards. Steps and stairs should be conspicuous and fitted with handrails of a design allowing a satisfactory grasp. In addition to consideration of the specification of flooring and stairways, primary prevention involves attention to the equipment used (eg to avoid spillages and other walkway contamination), the manner in which equipment is arranged, the tasks people need to perform, and the extent to which each of these might affect the risk of falling. Provision of sufficient storage is a measure aimed at reducing the need for objects and materials to be placed in the walking path, which may then present a trip hazard.

Permanent means of access to height should be provided to avoid the need for use of portable steps and ladders. This should be the case even when access will only be infrequent, as might be the case with areas used for longer term storage or where there might be a need for maintenance, for example. It is desirable, where possible, to avoid the need for people to stand or walk on surfaces that might move unpredictably, as is sometimes the case with public transport. Where this is unavoidable, grab rails and other hand holds should be provided. Hand holds are also beneficial where people are required to perform awkward movements, getting into or out of a bath tub or for entry and egress from a vehicle for example. The presence of adequate lighting is important to allow people to monitor the walking surface and detect irregularities and other problems. Visual distraction should be avoided in situations

where it is important that individuals view the walking surface, as is the case when approaching steps, stairs or escalators.

It should be remembered that walking surfaces and pathways will need to be cleaned and maintained and the design and installation should make allowance for this. In addition, to avoid hazards being introduced by wear and tear, installations should be appropriately durable and resistant to damage. Pedestrian walkways can be protected from vehicle damage, for example, by ensuring there is physical separation between the two (eg through installation of bollards).

12.4.2 Risk reduction

Even with concerted attention to primary fall prevention, it is inevitable that fall hazards will continue to be present in the environment. Risk reduction measures are, therefore, necessary to reduce the likelihood of falls arising from these hazards. An important starting point is to raise awareness of the problem and, through education, promote understanding of risk factors for falling and how they can be ameliorated. Accompanying this is a need for risk assessment and risk management.

Where it is possible that slip or trip hazards might arise in an area used by pedestrians, it is important that adequate procedures are implemented to detect these and to remedy the situation. Indoor flooring will usually need to be cleaned periodically, partly for the sake of appearances, but also to remove dirt and debris that may present a risk of falling. During the cleaning process, it is possible that other fall hazards might be introduced, for example the risk of slipping with wet vinyl or tiled floor surfaces while these are drying. With regard to maintenance, routine inspection programmes should be arranged for walking areas and

pathways. In all cases, housekeeping procedures should be designed to be sustainable, so that initial good practices do not deteriorate to the point of becoming ineffective, as is sometimes the case.

Where fall hazards are present and can not be removed immediately, an obvious action is to warn of their existence. This can be through use of signage warning of a risk of slipping, or by marking step edges, for example. In circumstances where stairs have to be negotiated or where movements of a difficult nature need to be performed, then it may assist some, if not all users, to fit additional hand or grab rails. An important measure to prevent falls from height is to install barriers on edges and around areas open to a lower level. These guard rails may be permanent or temporary, depending on the situation. A primary prevention measure is to install sufficient lighting, however, this will only be effective if the lighting is actually used. Both carrying items and hurrying are other behavioural factors contributing to falls and should be discouraged in circumstances where other fall risk factors are present.

There are certain situations in which risk of falling is increased. Poor weather, resulting in outdoor areas becoming covered with ice or snow, is frequently accompanied by increased prevalence of falls, unless appropriate precautions have been taken. It should be possible to plan ahead for such occasions and authorities and employers ought to be ready and prepared to implement measures to reduce risk, either through clearing affected areas or by reducing exposure to the slippery conditions (eg by encouraging people to stay indoors). There may also be individuals at increased risk of falling, either due to frailty or a medical condition. Again, risk management protocols should be in place to reduce, as far as possible, the risk of injury to such persons. Mobility aids and personal protection, such as hip protectors, should be provided if assessment indicates that these will be beneficial.

12.4.3 Maximise capability

A third strand of the fall prevention process is to endeavour to maximise individual ability to cope with the challenges present in negotiating our everyday environment. Clearly this applies more to some groups of the population than others. An overarching activity should be to seek to promote and monitor health among vulnerable groups. Encouraging exercise to increase and maintain strength and coordination can help to improve balance. Diet can be beneficial in encouraging bone strength as well contributing to general health.

As already mentioned, certain medications can affect balance and concentration and there is good evidence of an association between polypharmacy and risk of falling. There is an onus on prescribers to consider fall risk when selecting medications, giving consideration to dose and interactions between different pharmaceutical products. Likewise, there is a responsibility on patients to follow the instructions provided by their doctors for taking their medication. Insomnia, often linked with anxiety, is a common complaint among the adult population and one of the reasons for the prescribing of benzodiazepines. Unwanted effects from these medicines include drowsiness, dizziness, unsteadiness and blurred vision, all problems undesirable from a fall prevention perspective. Trials of behavioural sleep management programmes have found these to be effective in improving sleep and offer a viable alternative to use of hypnotic drugs. The effects of alcohol on coordination and balance are well known. Use of alcohol should be discouraged where fall hazards are present and there is a particular need to avoid the existence of fall hazards in locations where alcohol is consumed regularly (eg in bars and clubs).

Use of footwear commensurate with the prevailing underfoot conditions is a measure that can help everyone, from the wearing of suitable footwear for slippery outdoor conditions, through

to use of shoes or boots with specialist soling in occupational situations where floor contamination can not be avoided. As risk of falling is reduced if people can see where they are going, it is appropriate to promote regular eyesight testing, along with encouragement to use spectacles appropriately.

12.5 Concluding remarks

It is axiomatic that falls are as much a part of everyday life as births, deaths and marriages. The complexity of the environments we negotiate on a daily basis, coupled with the fallibility of our species, means that it is inevitable that falls will continue to occur. But, nevertheless, many falls are preventable. One important route towards addressing the problem is through raising awareness and encouraging attention to the falls problem, in the same way that there is frequent discussion over safety on the roads. It is hoped that this book makes a modest contribution in this respect.