Preventing falls in older people living in the community

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Purpose and Summary of Document:
To describe the epidemiology of falls in Wales and to outline the interventions available to address these falls. It discusses the evidence around different approaches to assessment of falls risk and intervention and draws conclusions as to the best ways that the NHS in Wales can address primary and secondary prevention from a community care perspective.

The document covers falls as a ‘general’ group of injuries. It does not cover specific types of falls such as playground or work related. It is intended that these will be addressed in subsequent documents.
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1 Summary

1.1 What this document relates to

<table>
<thead>
<tr>
<th>This document applies to</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age group</strong></td>
</tr>
<tr>
<td><strong>Type of injury</strong></td>
</tr>
<tr>
<td><strong>Prevention level</strong></td>
</tr>
<tr>
<td><strong>Setting for interventions</strong></td>
</tr>
<tr>
<td><strong>Setting for benefits</strong></td>
</tr>
<tr>
<td><strong>Partners in delivering intervention</strong></td>
</tr>
</tbody>
</table>

This document is intended to guide, rather than dictate, an approach to intervention.

Information about changes to the approach suggested, and the success, or otherwise, of these would be useful to guiding subsequent versions of this document.

1.2 Background

Falls place a significant burden upon health and health services in Wales and across the UK.

Understanding the epidemiology of falls in Wales is important to support the implementation of interventions for which there is good evidence of effectiveness. Clear guidance on the interpretation of the evidence and support for implementation is needed to simplify the process in an area with a vast amount of information.

1.3 Estimates of falls incidence

Based on data on the incidence of falls in community dwelling older people, we can estimate the annual numbers of falls to older people in Wales as being between 230,000 and 460,000 (figure 1). These figures do not encompass the much higher falls incidence amongst older people in nursing and residential care.
Figure 1:- Summary of falls epidemiology, adapted from Rubenstein and Josephson (2002), Cummings and Melton (2002), Peel et al (2002)

Across Wales, between 115,000 and 230,000 fall more than once and 11,500 to 45,900 suffer a fracture, head injury or serious laceration (figure 2); this equates to between 32 and 126 injury falls per day in Wales.

Figure 2:- Summary of falls incidence in Wales in 2010 and predictions for 2015
The largest impact will be felt in Health Boards with higher proportions of older people, in particular, Powys and Hywel Dda.

### 1.4 Mortality

There are around 200 fall related deaths in Wales each year. The proportion of deaths that are due to falls increases substantially with increasing age.

There is evidence to suggest that official mortality data greatly underestimate the true mortality associated with falls.

### 1.5 In-patient burden

There are around 21,000 fall related in-patient admissions each year in Wales.

Reducing the numbers of injurious falls that require hospital admission will reduce burden on in-patient services. But, with fall lengths of stay of up to 17 days, on average, and twice as long as overall stay lengths, gains are to be made by reducing lengths of stay.

Tertiary prevention is therefore important, as is delivery of appropriate care at appropriate time and co-ordination of multi-disciplinary teams to ensure that discharge is not delayed.

### 1.6 Evidence for interventions

There is a need to target more falls prevention at over 60 year olds in Wales. The actual ages at which different elements are targeted may need further, possibly local, discussion, but it is clear that more can be done at more points on the patient pathway to reduce falls and the burden of falls.

There is evidence that older people should be asked routinely and on a regular basis about falls and their risk factors for falling. An annual risk assessment or screening process is advocated to identify those at higher risk.

However, it is also important that the ‘low risk’ or the ‘never fallers’ maintain this status and population based exercise programmes to provide strength and balance training have demonstrated evidence of effectiveness.

Those at higher risk of falling then need appropriate risk factor assessment, management and referrals, if necessary, to modify their risk of falling. For those with few risk factors management solely within
primary care may be possible, with more complex cases referred for comprehensive geriatric assessment.

There is no consensus on which risk factors should be assessed, but review of the guidance and evidence suggests that multi-factorial assessment is required, looking at balance and gait, medications, visual impairments, reasons for falling / cardiovascular issues, memory and behavioural problems, depression, dizziness and fear of falling. Algorithms are provided, in the accompanying document, giving the evidence for these assessments, suggesting tests to be used and action to be taken given different outcomes and interventions for which there is evidence of effectiveness.

There is some evidence of cost effectiveness, but good quality data are difficult to develop and it is difficult to see that it would be possible to generate such data within a reasonable time frame.

1.7 Next steps

The nature of falls prevention in Wales at the moment tends to focus on those suffering only major injuries (figure 3), however, there are efforts being made to tackle more minor A and E treated injuries.

The services that do exist and the part of the pathway that they target need to be clearly identified and evaluated. These services need to be evidence based and having a demonstrable effect on outcomes.

Where there are no services or services that tackle only a very small part of the patient pathway, consideration is needed as to where and what intervention is most appropriate. Intervention is essential to avoid the 2015 predictions becoming a reality.

Public Health in Wales has, to date, not been heavily involved in neither the development nor delivery of falls prevention services. A number of potential roles have become apparent:

1) Supporting Health Boards in identifying and evaluating current services

2) Supporting Health Boards in delivering new services, such as:-
   a) falls ‘screening’, assessment and intervention aimed at individuals, including in piloting and evaluation of such a service.
   b) Population based interventions to reduce falls risk, for example, exercise or awareness raising
Figure 3:- Falls pathway

Key:- Grey boxes indicate areas where interventions have historically been delivered and where work is currently underway. These include work by NLIAH and WAST. Yellow boxes indicate where the evidence base has demonstrated that intervention is effective and available in addition to what is already being done.
3) Development of health board level epidemiology to support on-going assessment of incidence of falls.

Public Health Wales may now seek to take on all or some of these roles. Falls are an important Public Health issue and one in which active involvement is essential.

1.8 Conclusions

Falls are already a significant burden upon health and health services in Wales and will only become a greater burden in the future as the size of the older population increases.

A coherent, high quality approach to falls prevention is now needed in Wales. Effective interventions exist, but these need to be implemented across the falls pathway.

The weight of the current guidance is behind the implementation of fall risk screening for older people. There is also a need for population level interventions to keep never fallers from falling for as long as possible.

At a tertiary level, the challenge is, as with many conditions suffered by older people, to reduce very long lengths of stay in hospital for older fallers who require admission.

Falls prevention will require investment and expectations of the effect of reduction in falls on the NHS as a whole need to be carefully managed. In addition, although falls are common, being able to detect a significant impact of falls prevention on the NHS in Wales is likely to be difficult in the short term.

1.9 Recommendations

Falls prevention in Wales needs to become high priority and proactive.

- Stand up against falling down

Too many people believe that falling is an inevitable part of ageing. It is not. NHS professionals and the general public need to be aware that falls can be prevented.

- Stop never fallers from becoming ever fallers
One of the simplest and most effective methods of falls prevention is exercise to improve strength and balance. Delivered at a population level, this can help to prevent people who have never fallen from falling.

- Take a proactive approach to risk assessment

Current NHS approaches wait for people to fall and hurt themselves before seeking to manage risk. By carrying out annual risk assessments in primary care, fall risk factors can be identified and modified before an injury occurs. This means that the burden of emergency care on the NHS is reduced.

- Take a ‘one day sooner’ approach to fallers admitted to hospital

Lengths of stay following a fall are long and place a significant burden upon the NHS. Analysis of admissions data suggest that reducing lengths of stay by just one day can reduce the NHS burden substantially.

- Ensure that current practice is good practice

Evaluation of current services is also needed to ensure that current practice is good practice.
2 Background

Falls place a significant burden upon health and health services in the UK.

General practice data suggest that there are around 475,000 falls amongst over 60 year olds in the UK each year (Gribben et al, 2009). A proportion of these result in hip fractures and following a hip fracture, risk of mortality is 11% to 23% at 6 months and 22% to 29% at 12 months (Haleem et al, 2008). In 2008, more than 3,400 people were estimated to have died from a fall in England and Wales (ONS, 2009).

Data from 1999 showed that there were 647,721 A&E attendances and 204,424 in-patient admissions of over 60 year olds following a fall in the UK. These were estimated to cost a total of £981M, with £581M met by the NHS (Scuffman, 2003). Given the increases in the elderly population since 1999 and the projections for further increases, the burden and cost burden will already have increased considerably and will increase still further in the future.

However, the complexity of falls means that we often lack high quality epidemiological data on the incidence and outcomes of falls at a local level. In addition, efforts to reduce the burden of falls are often either lacking a sound evidence base, or are applied in an inappropriate manner or setting.

High quality data are important to make a case for tackling the problem and to monitoring the effectiveness of interventions applied. But, the lack of local level data is not good grounds to delay action. There is sufficient national information to make a rational case for action.

However, even once a decision is made to take action, a potentially bewildering array of guidelines, assessment tools and interventions exist, each purporting to be more ‘comprehensive’ than the last and to provide a ‘complete’ programme.

The difficulty is that the evidence for the different falls risk factors is variable. There is no definitive ‘top 10’ ranking of falls risk factors and the factors to be assessed and addressed varies slightly with each programme.

There is also a lack of evidence around the effectiveness of different interventions. This is partly due to the nature of the interventions themselves; many are multi dimensional. They are also provided in many different settings and circumstances all of which are affected by the different populations and health care systems in which they are provided. Finally, the variety of outcomes of falls and the incidence of these outcomes can affect the likelihood of detecting significant effects.
3 Scope

This guidance relates to older people who live in the community and who are at risk of falling or who have fallen and suffered no injury, minor injury or serious injury.

It presents data on the epidemiology of falls and discusses the evidence for the primary and secondary prevention of falls amongst community dwelling older people while living in the community. It takes a pragmatic view of the guidance and evidence available on falls assessment and interventions to suggest an approach to primary prevention of falls in Wales.

It is not a systematic review of the evidence.

For an individual to review the full body of evidence on this subject would require reading that would take more than an entire career (Fraser and Dunstan, 2010), even in a very narrow area of this field. Even a brief glance at the options available is enough to leave an individual feeling overwhelmed. Obviously, the process can be simplified by reviewing only the highest quality documents, but even doing this for risk factors, assessment processes and interventions is a significant undertaking.

It discusses falls as a general cause of injury. It does not make any specific reference to fragility fractures arising from falls; these are covered in detail by the Blue Book (BOA / BGS, 2007). This is consistent with the approach taken by NICE (2004), when they produced guidance on falls, but stated that the prevention and treatment of osteoporosis would be addressed separately.

In terms of Osteoporosis, NICE has recently published three Technology Appraisals; TA160 Osteoporosis primary prevention (January 2011), TA161 Osteoporosis secondary prevention (January 2011), TA204 Prevention of Osteoporotic fractures (denosumab). It also has guidance on the risk assessment of people with osteoporosis in progress.

It does not cover specific outcomes of falls, such as hip fracture. The National Hip Fracture Audit is described in section 7.1.1 as an example of on-going national work to improve care of patients with hip fracture and reduce likelihood of further fracture. Hip fracture is also the subject of a consultation recently carried out by NICE to produce a draft guideline on the management of hip fracture in adults. This consultation opened in November 2010 and closed in January 2011.

It does not cover in-patient management of patients who are being treated following a fall. Hip fracture patients are mentioned in terms of the audit, but given the number of possible outcomes of a fall, putting
together detailed evidence based guidance on the in-patient management of each is impractical.

It does not cover strategies to prevent falls in people in hospital as in-patients for reasons other than those related to falling. While such an issue represents an important part of the burden of falls on health and health services, it is a patient safety issue, rather than a community safety issue and involves very different interventions and partners in delivering such strategies.

It is intended to guide, rather than mandate an approach, but it is intended that with information and advice from new publications and guidance and from those implementing interventions on the ground, that modifications and improvements will be made.
4 Epidemiology

Falls are a common and serious problem amongst the elderly. It has been reported that 30% to 60% of community dwelling older adults fall each year, with around half of these falling more than once (Rubenstein and Josephson, 2002; figure 4). Incidence rises with age such that half of women and a third of men aged over 85 fall every year (Cummings and Melton, 2002; Peel et al., 2002).

Figure 4: Summary of falls epidemiology, adapted from Rubenstein and Josephson (2002), Cummings and Melton (2002), Peel et al (2002)

Of those who fall, 5% to 10% suffer a fracture, head injury or serious laceration (Rubenstein and Josephson, 2002).

It is estimated that in the USA, 10% of A&E visits and 6% of hospitalisations of elderly people are due to falls (Tinetti, 2003), while in Australia, 18% of over 65s attending A&E do so because of a fall and 58% of these are then admitted to hospital (Bell et al., 2000).

Much of the burden of falls is related to falls that result in hip fracture and require long stay hospital admissions. Older people who suffer fall related hip fractures suffer significant long term effects, with 25% to 75% not recovering their pre-fracture function levels (Magaziner et al., 1990). They are also at high risk of fall and second fracture (Sherrington and Lord, 1998).

Amongst older people who are cognitively impaired, incidence of falls rises to 70% - 80% (Shaw et al, 2003; Van Dijk et al, 1993). Major injury was found to rise to 21%-28% and fractured neck of femur to 5%-8% in the study carried out in Newcastle, UK (Shaw et al, 2003). In addition, A and
E attendance was required by 32%-40% and hospital admission by 13%-15%.

4.1 Older population in Wales

Based on the epidemiological data from previous studies carried out in various places and population data for Wales, it is possible to estimate the annual incidence of falls and also predictions for future incidence, based on population projections\(^1\) (table 1).

**Table 1:** Wales and Health Boards populations and population projections for older people (thousands)

<table>
<thead>
<tr>
<th>Area</th>
<th>Total pop’n(^2)</th>
<th>60-74</th>
<th>75+</th>
<th>Total 60+</th>
<th>60-74</th>
<th>75+</th>
<th>Total 60+</th>
<th>% change in total 60+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wales</td>
<td>2,980.0</td>
<td>502.0</td>
<td>263.2</td>
<td>765.2</td>
<td>534.9</td>
<td>289.2</td>
<td>824.1</td>
<td>7.7%</td>
</tr>
<tr>
<td>Betsi Cadwaladr</td>
<td>678.5</td>
<td>124.9</td>
<td>64.0</td>
<td>188.9</td>
<td>133.1</td>
<td>71.3</td>
<td>204.4</td>
<td>8.2%</td>
</tr>
<tr>
<td>Powys</td>
<td>132.0</td>
<td>27.6</td>
<td>14.3</td>
<td>41.9</td>
<td>30.6</td>
<td>16.1</td>
<td>46.7</td>
<td>11.5%</td>
</tr>
<tr>
<td>Hywel Dda</td>
<td>375.2</td>
<td>72.9</td>
<td>37.4</td>
<td>110.3</td>
<td>79.5</td>
<td>41.8</td>
<td>121.3</td>
<td>10.0%</td>
</tr>
<tr>
<td>Abertawe Bro Morgannwg</td>
<td>499.4</td>
<td>82.2</td>
<td>44.3</td>
<td>126.5</td>
<td>86.8</td>
<td>48</td>
<td>134.8</td>
<td>6.6%</td>
</tr>
<tr>
<td>Cwm Taf</td>
<td>289.4</td>
<td>45.8</td>
<td>23.4</td>
<td>69.2</td>
<td>48.3</td>
<td>25.3</td>
<td>73.6</td>
<td>6.4%</td>
</tr>
<tr>
<td>Cardiff and Vale</td>
<td>445.4</td>
<td>58.0</td>
<td>33.3</td>
<td>91.3</td>
<td>62.0</td>
<td>35.1</td>
<td>97.1</td>
<td>6.4%</td>
</tr>
<tr>
<td>Aneurin Bevan</td>
<td>560.5</td>
<td>91.6</td>
<td>47.4</td>
<td>139</td>
<td>97.1</td>
<td>52.5</td>
<td>149.6</td>
<td>7.6%</td>
</tr>
</tbody>
</table>

These data demonstrate that for falls, as well as other conditions where the risk of occurrence is greatest amongst the over 60s, the burden will increase more in Powys, by 11.5%, and in Hywel Dda, 10.0%. Given that these are rural areas, the challenge of delivering high quality services to fallers is significantly greater than in the more urban areas.

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Data source:- Statistical Directorate, Welsh Assembly Government / ONS

4.2 Incidence of falls in Wales

Population data can then be used to estimate numbers of falls and changes in these numbers and therefore provide indicators of service need and the need for intervention.

The following assumes that ‘older people’ are over 60 and that the epidemiological data are generalisable to Wales. The estimates will underestimate the true incidence, since they assume that all older people are community dwelling. The numbers of falls in older people resident in nursing and residential homes and sheltered accommodation are up to three times higher than for people living in the community (Shaw et al, 2003; Tinetti et al, 1988). The predictions also assume that no additional interventions are put in place that may reduce incidence.

The estimates suggest that almost half a million people over the age of 60 fall every year in Wales, based on the current population estimates (table 2), with up to 46,000 of these suffering serious injury.

Table 2:- Wales and Health Boards estimated incidence of falls and fall related injuries in 2010 (thousands)

<table>
<thead>
<tr>
<th>Area</th>
<th>Total 60+ popn</th>
<th>Estimated number suffering a fall each year</th>
<th>Estimated number falling more than once</th>
<th>Estimated number suffering fracture, head injury or serious laceration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Wales</strong></td>
<td>765.2</td>
<td>230.0 to 460.0</td>
<td>115.0 to 230.0</td>
<td>15.3 to 45.9</td>
</tr>
<tr>
<td><strong>Betsi Cadwaladr</strong></td>
<td>188.9</td>
<td>56.7 to 113.3</td>
<td>28.3 to 56.7</td>
<td>3.8 to 11.3</td>
</tr>
<tr>
<td><strong>Powys</strong></td>
<td>41.9</td>
<td>12.6 to 25.1</td>
<td>6.3 to 12.6</td>
<td>0.8 to 2.5</td>
</tr>
<tr>
<td><strong>Hywel Dda</strong></td>
<td>110.3</td>
<td>33.1 to 66.2</td>
<td>16.5 to 33.1</td>
<td>2.2 to 6.6</td>
</tr>
<tr>
<td><strong>Abertawe Bro Morgannwg</strong></td>
<td>126.5</td>
<td>38.0 to 75.9</td>
<td>19.0 to 38.0</td>
<td>2.5 to 7.6</td>
</tr>
<tr>
<td><strong>Cwm Taf</strong></td>
<td>69.2</td>
<td>20.8 to 41.5</td>
<td>10.4 to 20.8</td>
<td>1.4 to 4.2</td>
</tr>
<tr>
<td><strong>Cardiff and Vale</strong></td>
<td>91.3</td>
<td>27.4 to 54.8</td>
<td>13.7 to 27.4</td>
<td>1.8 to 5.5</td>
</tr>
<tr>
<td><strong>Aneurin Bevan</strong></td>
<td>139.0</td>
<td>41.7 to 83.4</td>
<td>20.9 to 41.7</td>
<td>2.8 to 8.3</td>
</tr>
</tbody>
</table>

*Note:* These estimates assume the following:
- That the epidemiological data used to make these estimates are generalisable to Wales
- That all older people in Wales are community dwelling, therefore making these estimates a low assessment of the true incidence. There is also no accounting for increased risk associated with people with cognitive impairment and living in the community.

By 2015, with the projected population changes, there will be an increase in serious injuries of between 900 and 3,500 (tables 3/4). Given the severity of injury, this is likely to be a fair, but low, estimate of the increase in hospital admissions following falls.
Table 3: Wales and Health Boards estimated incidence of falls and fall related injuries in 2015 (thousands)

<table>
<thead>
<tr>
<th>Area</th>
<th>Total 60+ popn</th>
<th>Estimated number suffering a fall each year</th>
<th>Estimated number falling more than once</th>
<th>Estimated number suffering fracture, head injury or serious laceration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wales</td>
<td>824.1</td>
<td>247.2 to 494.5</td>
<td>123.6 to 247.2</td>
<td>16.5 to 49.4</td>
</tr>
<tr>
<td>Betsi Cadwaladr</td>
<td>204.4</td>
<td>61.3 to 122.6</td>
<td>30.7 to 61.3</td>
<td>4.1 to 12.3</td>
</tr>
<tr>
<td>Powys</td>
<td>46.7</td>
<td>14.0 to 28.0</td>
<td>7.0 to 14.0</td>
<td>0.9 to 2.8</td>
</tr>
<tr>
<td>Hywel Dda</td>
<td>121.3</td>
<td>36.4 to 72.8</td>
<td>18.2 to 36.4</td>
<td>2.4 to 7.3</td>
</tr>
<tr>
<td>Abertawe Bro Morgannwg</td>
<td>134.8</td>
<td>40.4 to 80.9</td>
<td>20.2 to 40.4</td>
<td>2.7 to 8.1</td>
</tr>
<tr>
<td>Cwm Taf</td>
<td>73.6</td>
<td>22.1 to 44.2</td>
<td>11.0 to 22.1</td>
<td>1.5 to 4.4</td>
</tr>
<tr>
<td>Cardiff and Vale</td>
<td>97.1</td>
<td>29.1 to 58.3</td>
<td>14.6 to 29.1</td>
<td>2.0 to 5.8</td>
</tr>
<tr>
<td>Aneurin Bevan</td>
<td>149.6</td>
<td>44.9 to 89.8</td>
<td>22.4 to 44.9</td>
<td>3.0 to 9.0</td>
</tr>
</tbody>
</table>

Table 4: Wales and Health Boards estimated change in incidence of injurious falls

<table>
<thead>
<tr>
<th>Area</th>
<th>Numbers suffering fracture, head injury or serious laceration</th>
<th>Change (thousands)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2010</td>
<td>2015</td>
</tr>
<tr>
<td>Wales</td>
<td>15.3 to 45.9</td>
<td>16.5 to 49.4</td>
</tr>
<tr>
<td>Betsi Cadwaladr</td>
<td>3.8 to 11.3</td>
<td>4.1 to 12.3</td>
</tr>
<tr>
<td>Powys</td>
<td>0.8 to 2.5</td>
<td>0.9 to 2.8</td>
</tr>
<tr>
<td>Hywel Dda</td>
<td>2.2 to 6.6</td>
<td>2.4 to 7.3</td>
</tr>
<tr>
<td>Abertawe Bro Morgannwg</td>
<td>2.5 to 7.6</td>
<td>2.7 to 8.1</td>
</tr>
<tr>
<td>Cwm Taf</td>
<td>1.4 to 4.2</td>
<td>1.5 to 4.4</td>
</tr>
<tr>
<td>Cardiff and Vale</td>
<td>1.8 to 5.5</td>
<td>2.0 to 5.8</td>
</tr>
<tr>
<td>Aneurin Bevan</td>
<td>2.8 to 8.3</td>
<td>3.0 to 9.0</td>
</tr>
</tbody>
</table>

The greatest impact of these increases is likely to be in Powys, where the predicted change in numbers of injurious falls matches that of Cardiff, but where the population is around one third the size of Cardiff and Vale’s and where the provision of appropriate services is considerably more difficult.

4.2.1 Summary

Falls already place a significant burden on health in Wales. It is a reasonable estimate that there are currently up to 46,000 per year that cause significant injury and that this will rise to 50,000 by 2015 as a result of population changes.

The largest impact will be felt in Health Boards with higher proportions of older people, in particular, Powys and Hywel Dda.
4.3 Falls pathway

As illustrated in figure 1, falls and the outcomes that result are complex. A trip or slip may or may not result in a fall, a fall may or may not result in injury, medical assistance may or may not be sought following injury (figure 5).

Although not wholly comprehensive, the figure serves to illustrate that intervening too late in the pathway, or in too narrow an area of the pathway means that many fallers are left unrecognized or untreated. This also means that they may merely be fed back into the ‘loop’ to fall again.

What is lacking from the pathway is clear understanding of how many people enter each element of the pathway. What such data would show, and help to justify, is where resources would best be targeted to produce the best outcomes. Currently, much of the falls prevention interventions take place in the in-patient setting, after a person has suffered a serious injurious fall. Programmes have recently been implemented to identify fallers who are treated in emergency departments and intervene (NLIAH) and the Welsh Ambulance Service Trust (WAST) is seeking to identify and intervene with fallers who are not injured but require ‘picking up’ from the floor. Even without the appropriate data, the figure suggests that there are likely to be more fallers at other stages of the pathway who could be identified with a view to preventing future falls and breaking the cycle.
**Figure 5: Falls pathway**

Key:- Grey boxes indicate areas where interventions have historically been delivered and where work is currently underway. These include work by NLIAH and WAST.
Yellow boxes indicate where the evidence base has demonstrated that intervention is effective and available in addition to what is already being done.
4.4 Fall related mortality in Wales

4.4.1 Mortality data - methods

Stats Wales\(^3\) data for 2001 to 2006 were available for all fall related deaths (ICD-10 codes W00 to W19).

Mortality data were available from National Statistics\(^4\) for all falls deaths in England and Wales (ICD-10 codes W00 to W19), for 2006 to 2008, by age and sex.

4.4.2 Mortality data – trends in all falls deaths

Falls deaths in Wales have been increasing since 2002 (table 5).

<table>
<thead>
<tr>
<th></th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Falls</td>
<td>220</td>
<td>170</td>
<td>194</td>
<td>198</td>
<td>194</td>
<td>244</td>
</tr>
<tr>
<td>% change</td>
<td>-22.7%</td>
<td>14.1%</td>
<td>2.1%</td>
<td>-2.0%</td>
<td>25.8%</td>
<td></td>
</tr>
</tbody>
</table>

However, interpreting these data is difficult. The numbers and changes are relatively small. The data include all ages, not just older people. There may have been changes in coding practices that have contributed to these changes. Finally, they are numerators only, not adjusted for changes in population size or distribution.

4.4.3 Mortality data – trends in falls death rates

Analysis of trends in fall related deaths across England and Wales shows that there were few changes in fall related death rates between 2006 and 2008 (table 6). Male death rates were consistently higher than female, but with the gap narrowing with increasing age.


### Table 6: England and Wales fall injury death rates per million, selected age groups, 2006 to 2008

<table>
<thead>
<tr>
<th></th>
<th>Males</th>
<th>All</th>
<th>45-54</th>
<th>55-64</th>
<th>65-74</th>
<th>75-84</th>
<th>85 and over</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>2006</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>48</td>
<td>39</td>
<td>58</td>
<td>110</td>
<td>365</td>
<td>1,213</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2007</td>
<td>48</td>
<td>36</td>
<td>60</td>
<td>115</td>
<td>375</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2008</td>
<td>48</td>
<td>43</td>
<td>58</td>
<td>111</td>
<td>395</td>
</tr>
<tr>
<td></td>
<td>Females</td>
<td>All</td>
<td>45-54</td>
<td>55-64</td>
<td>65-74</td>
<td>75-84</td>
<td>85 and over</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2006</td>
<td>29</td>
<td>17</td>
<td>24</td>
<td>61</td>
<td>299</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2007</td>
<td>29</td>
<td>14</td>
<td>26</td>
<td>63</td>
<td>299</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2008</td>
<td>31</td>
<td>17</td>
<td>28</td>
<td>67</td>
<td>304</td>
</tr>
</tbody>
</table>


### 4.4.4 England and Wales falls in relation to all deaths

Fall related deaths account for less than 1% of all deaths (table 7), but, almost 1 in 5 injury deaths. This increases to more than 1 in 3 in over 75 year olds. The causes of the remaining injury related deaths are not clear.

**Table 7:** Trends in fall deaths in relation to all deaths and injury deaths, by age group

<table>
<thead>
<tr>
<th>Falls as a % of all deaths</th>
<th>All Ages</th>
<th>0 to 14</th>
<th>15 to 59</th>
<th>60 to 74</th>
<th>75+</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>0.7%</td>
<td>0.3%</td>
<td>0.9%</td>
<td>0.5%</td>
<td>0.7%</td>
</tr>
<tr>
<td>2007</td>
<td>0.7%</td>
<td>0.2%</td>
<td>0.9%</td>
<td>0.5%</td>
<td>0.7%</td>
</tr>
<tr>
<td>2008</td>
<td>0.7%</td>
<td>0.2%</td>
<td>0.9%</td>
<td>0.5%</td>
<td>0.7%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Falls as a % of injury deaths</th>
<th>All Ages</th>
<th>0 to 14</th>
<th>15 to 59</th>
<th>60 to 74</th>
<th>75+</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>19.2%</td>
<td>4.9%</td>
<td>5.8%</td>
<td>23.9%</td>
<td>34.7%</td>
</tr>
<tr>
<td>2007</td>
<td>19.2%</td>
<td>2.3%</td>
<td>5.9%</td>
<td>25.1%</td>
<td>35.3%</td>
</tr>
<tr>
<td>2008</td>
<td>19.2%</td>
<td>2.8%</td>
<td>5.9%</td>
<td>25.0%</td>
<td>36.0%</td>
</tr>
</tbody>
</table>


There were few changes in fall related deaths in relation to all deaths and all injury deaths between 2006 and 2008.

### 4.4.5 Comments based on the literature

The analysis presented above was based on data available from official data sources, however, there is evidence to suggest that these data underestimate the true mortality associated with falls.

An analysis of injury indicators by Lyons et al (2005), calculating deaths associated with hip fractures based on incidence and survival rates from cohort studies, found that 10,800 deaths were expected in England and Wales. However, official data suggest that there were just 3,800 deaths associated with all falls. This is partly due to delayed deaths being mis-coded, but has the effect of vastly underestimating the mortality burden of falls.
The consequences are then that the true burden of falls is not recognised by neither policy makers, the NHS nor the general public and there is a failure to properly implement interventions that are known to be effective.

4.4.6 Summary

There are around 200 fall related deaths in Wales each year, but detailed information on who suffers these deaths is not available here.

The proportion of deaths that are due to falls increases substantially with increasing age.

There is evidence to suggest that official mortality data greatly underestimate the true mortality associated with falls.
4.5 Wales - In-patient burden of falling

4.5.1 Methods

Data on falls suffered by Welsh residents were obtained from PEDW\(^5\).

Falls are assigned ICD-10 codes W00 to W19. The majority of these cover ‘general’ falls, others are more specific (table 8). The codes shown in bold refer to falls that could be suffered by almost anyone at any time, but are most likely to be suffered by older people. These are the falls that are the subject of this document. The more specific falls are also likely to require different interventions. However, the inclusion of these codes in a patient record can be affected by patient’s ability to describe or recall the circumstances leading to the injury and the coding practice of the hospital.

Table 8: ICD-10 codes describing falls\(^6\)

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>W00</td>
<td>Fall on same level involving ice and snow</td>
</tr>
<tr>
<td>W01</td>
<td>Fall on same level from slipping tripping and stumbling</td>
</tr>
<tr>
<td>W02</td>
<td>Fall involving ice-skates skis roller-skates or skateboards</td>
</tr>
<tr>
<td>W03</td>
<td>Other fall same level due collision/pushing by another person</td>
</tr>
<tr>
<td>W04</td>
<td>Fall while being carried or supported by other persons</td>
</tr>
<tr>
<td>W05</td>
<td>Fall involving wheelchair</td>
</tr>
<tr>
<td>W06</td>
<td>Fall involving bed</td>
</tr>
<tr>
<td>W07</td>
<td>Fall involving chair</td>
</tr>
<tr>
<td>W08</td>
<td>Fall involving other furniture</td>
</tr>
<tr>
<td>W09</td>
<td>Fall involving playground equipment</td>
</tr>
<tr>
<td>W10</td>
<td>Fall on and from stairs and steps</td>
</tr>
<tr>
<td>W11</td>
<td>Fall on and from ladder</td>
</tr>
<tr>
<td>W12</td>
<td>Fall on and from scaffolding</td>
</tr>
<tr>
<td>W13</td>
<td>Fall from out of or through building or structure</td>
</tr>
<tr>
<td>W14</td>
<td>Fall from tree</td>
</tr>
<tr>
<td>W15</td>
<td>Fall from cliff</td>
</tr>
<tr>
<td>W16</td>
<td>Diving/jump into water cause injury other than drowning/submersion</td>
</tr>
<tr>
<td>W17</td>
<td>Other fall from one level to another</td>
</tr>
<tr>
<td>W18</td>
<td>Other fall on same level</td>
</tr>
<tr>
<td>W19</td>
<td>Unspecified fall</td>
</tr>
</tbody>
</table>

Where possible, the ‘general’ falls have been collapsed into a single group. This is because the use of, for example, W10 v W17 referring to falls involving steps or from different levels, is likely to be highly subjective and use of W19 is likely to be due to a lack of information that would more accurately describe the fall. In some cases though, the data are not appropriate to collapse further.


\(^6\) [http://apps.who.int/classifications/apps/icd/icd10online/](http://apps.who.int/classifications/apps/icd/icd10online/). Accessed 30 July 2010
Data were available for 2005/06 to 2008/09. Generally, annual averages are presented in the main body of the text, with the annual data in the appendices. The exceptions are where there are obvious variations in the trends over time.

Admission rates have been calculated, where possible and appropriate, using ONS mid-year population estimates\(^7\) (MYE). These data cover financial years, therefore, for the year 2005/06, for example, the 2005 MYE has been used.

Data on deprivation status of in-patients were obtained from the Secure Anonymised Linkage (SAIL) system in the Health Information Research Unit at Swansea University.

Data from the Welsh Index of Multiple Deprivation (WIMD) for 2008 were linked at the Lower Super Output Area (LSOA) level to the place of residence of each individual admitted to hospital following a fall.

Population estimates for 2009, obtained from the Public Health Wales Observatory, were used to calculate fall rates by deprivation fifth.

\(^7\) http://www.statistics.gov.uk/statbase/Product.asp?vlnk=15106, accessed 30 July 2010
4.5.2 Admissions – numbers

‘General’ falls, account for 2.8% of all hospital admissions\(^8\) annually, around one third of all injury admissions (31.7%) and around 90% of all fall related injury admissions (table 9; appendix 13.1).

**Table 9:- Admissions coded as falls, annual average**

<table>
<thead>
<tr>
<th></th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>765906</td>
</tr>
<tr>
<td>Injury admissions</td>
<td>66614</td>
</tr>
<tr>
<td>Fall admissions</td>
<td>23442</td>
</tr>
<tr>
<td>General fall admissions</td>
<td>21090</td>
</tr>
<tr>
<td>General falls as % of all admissions</td>
<td>2.8%</td>
</tr>
<tr>
<td>General falls as % of all injuries</td>
<td>31.7%</td>
</tr>
<tr>
<td>General falls as % of all falls</td>
<td>90.0%</td>
</tr>
</tbody>
</table>

4.5.3 Admissions – trends 2005/06 to 2008/09

Injury admissions have stabilised at around 22.6 per 1000 population since 2006/07, following an increase from 2005/06 (figure 6; table 10). There has been little or no change in fall related admissions, which stand at 7 to 8 per 1000 population.

**Figure 6:- Trends in all and general fall admissions and trends in rates of all and general fall admissions**

---

8 In-patient stays are generally described either in terms of Finished Consultant Episodes (FCEs) or Admissions. Finished consultant episodes describe the time a patient spends in the continuous care of one consultant. A patient may be cared for by a number of consultants during a single in-patient stay.

Admissions refer to only those FCEs in which a patient was admitted to the Trust. Patients transferred from another Trust for on-going treatment of the same condition will be regarded as a new admission. Admissions can over-simplify the picture of need since the reason for initial admission may be very different to that for which a longer stay is required. There are generally around 10% more FCEs than Admissions.
Table 10: Admission rates, coded as falls, per 1000 population, per year

<table>
<thead>
<tr>
<th>per annum</th>
<th>2005/06</th>
<th>2006/07</th>
<th>2007/08</th>
<th>2008/09</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total admission rate</td>
<td>250.4</td>
<td>257.2</td>
<td>257.0</td>
<td>266.9</td>
</tr>
<tr>
<td>Injury admission rate</td>
<td>21.9</td>
<td>22.7</td>
<td>22.6</td>
<td>22.6</td>
</tr>
<tr>
<td>Falls admission rate</td>
<td>7.8</td>
<td>8.0</td>
<td>7.9</td>
<td>7.9</td>
</tr>
<tr>
<td>General falls admission rate</td>
<td>7.0</td>
<td>7.2</td>
<td>7.1</td>
<td>7.1</td>
</tr>
</tbody>
</table>

4.5.4 Male and female trends 2005/06 to 2008/09

Overall numbers and rates of FCEs are generally higher for females (ratio approx 1:1.2; figure 7; table 11; appendix 13.2), with the gap between males and females consistent over time. Males experience more injury FCEs (around 26 per 1000 popn v 23 per 1000), but fewer fall related FCEs than women (6 to 7 per 1000 popn v around 9 per 1000).

Figure 7: Trends in all and general fall FCEs and FCE rates per 1000 population, males and females

Table 11: Fall FCE rates, per 1000 male and female population, per year

<table>
<thead>
<tr>
<th></th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005 / 06</td>
<td>260.6</td>
<td>267.1</td>
</tr>
<tr>
<td>2006 / 07</td>
<td>266.5</td>
<td>276.0</td>
</tr>
<tr>
<td>2007 / 08</td>
<td>276.0</td>
<td>309.2</td>
</tr>
<tr>
<td>2008 / 09</td>
<td>317.9</td>
<td>318.3</td>
</tr>
</tbody>
</table>

Injury FCEs have shown few changes over time.

General falls account for a greater proportion of FCEs for women in relation to all FCEs (2.9%), all injuries (38.6%) and all falls (94.6%; table 12).
Table 12: FCEs coded as falls; males and females

<table>
<thead>
<tr>
<th></th>
<th>Male</th>
<th>Female</th>
<th>% of all</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>387322</td>
<td>485366</td>
<td>55.6%</td>
</tr>
<tr>
<td>All injuries</td>
<td>38034</td>
<td>35893</td>
<td>48.6%</td>
</tr>
<tr>
<td>All falls</td>
<td>10781</td>
<td>14655</td>
<td>57.6%</td>
</tr>
<tr>
<td>General falls</td>
<td>9172</td>
<td>13864</td>
<td>60.2%</td>
</tr>
<tr>
<td>General falls as a % of total</td>
<td>2.4%</td>
<td>2.9%</td>
<td></td>
</tr>
<tr>
<td>General falls as a % of all injuries</td>
<td>24.1%</td>
<td>38.6%</td>
<td></td>
</tr>
<tr>
<td>General falls as a % of all falls</td>
<td>85.1%</td>
<td>94.6%</td>
<td></td>
</tr>
</tbody>
</table>

4.5.5 Falls by age group

Over 60 year olds account for just under half (46.8%; table 13; appendix 13.3) of all FCEs, and 39.4% of injury FCEs. However, over 60s experience 65.0% of all general fall FCEs. General fall FCEs in over 75 year olds are equal to all other age groups combined.

Table 13: FCEs coded as falls; by age group

<table>
<thead>
<tr>
<th></th>
<th>Annual average</th>
<th>Age 0-14</th>
<th>Age 15-59</th>
<th>Age 60-74</th>
<th>Age 75+</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>Total</td>
<td>83978 9.6%</td>
<td>380108 43.6%</td>
<td>197196 22.6%</td>
<td>211296 24.2%</td>
<td>872577</td>
<td></td>
</tr>
<tr>
<td>Injuries</td>
<td>9424 11.2%</td>
<td>41643 49.4%</td>
<td>12829 15.2%</td>
<td>20452 24.2%</td>
<td>84348</td>
<td></td>
</tr>
<tr>
<td>All falls</td>
<td>3627 14.1%</td>
<td>6402 24.9%</td>
<td>3914 15.2%</td>
<td>11769 45.8%</td>
<td>25712</td>
<td></td>
</tr>
<tr>
<td>General falls</td>
<td>2569 11.0%</td>
<td>5456 23.4%</td>
<td>3647 15.7%</td>
<td>11613 49.9%</td>
<td>23285</td>
<td></td>
</tr>
<tr>
<td>General falls as a % of total</td>
<td>3.1%</td>
<td>1.4%</td>
<td>1.8%</td>
<td>5.5%</td>
<td>2.7%</td>
<td></td>
</tr>
<tr>
<td>General falls as a % of all injuries</td>
<td>27.3%</td>
<td>13.1%</td>
<td>28.4%</td>
<td>56.8%</td>
<td>27.6%</td>
<td></td>
</tr>
<tr>
<td>General falls as a % of all falls</td>
<td>70.8%</td>
<td>85.2%</td>
<td>93.2%</td>
<td>98.7%</td>
<td>90.6%</td>
<td></td>
</tr>
</tbody>
</table>

There is an excess burden of falls on 0-14 year olds (3.1% of FCEs). However, the greatest burden is on people aged over 75, where 5.5%, or 1 in 20 of all FCEs are related to falls. In addition, more than half of injuries in this age group are fall related (56.8%).
4.5.6  Falls by length of stay

Summary length of stay\(^9\) (LoS) data were available from HSW. Generally, injury LoS was similar to that for all stays at an 8 day mean and 2 day median (table 14), but with falls seeing longer mean and median stays, in particular falls involving beds, (2008/09 mean 17.9 days, median 8.0 days) and unspecified falls (20.1 day mean and 7.0 day median). Insufficient information is available to determine whether these differences are either important or significant.

### Table 14: Mean and median lengths of stay following falls

<table>
<thead>
<tr>
<th></th>
<th>2005/06</th>
<th>2006/07</th>
<th>2007/08</th>
<th>2008/09</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Median</td>
<td>Mean</td>
<td>Median</td>
</tr>
<tr>
<td>Total</td>
<td>8.2</td>
<td>2.0</td>
<td>7.9</td>
<td>2.0</td>
</tr>
<tr>
<td>Injuries</td>
<td>7.7</td>
<td>2.0</td>
<td>7.6</td>
<td>2.0</td>
</tr>
<tr>
<td>W01 - Fall on same level from slipping tripping and stumbling</td>
<td>10.1</td>
<td>4.0</td>
<td>9.2</td>
<td>3.0</td>
</tr>
<tr>
<td>W03 - Other fall same level due collision / pushing by another person</td>
<td>2.5</td>
<td>1.0</td>
<td>2.9</td>
<td>1.0</td>
</tr>
<tr>
<td>W06 - Fall involving bed</td>
<td>17.0</td>
<td>8.0</td>
<td>15.0</td>
<td>7.0</td>
</tr>
<tr>
<td>W07 - Fall involving chair</td>
<td>14.0</td>
<td>4.0</td>
<td>13.9</td>
<td>4.0</td>
</tr>
<tr>
<td>W08 - Fall involving other furniture</td>
<td>5.8</td>
<td>1.0</td>
<td>7.6</td>
<td>1.0</td>
</tr>
<tr>
<td>W10 - Fall on and from stairs and steps</td>
<td>6.9</td>
<td>3.0</td>
<td>7.1</td>
<td>2.0</td>
</tr>
<tr>
<td>W17 - Other fall from one level to another</td>
<td>3.7</td>
<td>1.0</td>
<td>4.7</td>
<td>1.0</td>
</tr>
<tr>
<td>W18 - Other fall on same level</td>
<td>12.2</td>
<td>6.0</td>
<td>12.8</td>
<td>5.0</td>
</tr>
<tr>
<td>W19 - Unspecified fall</td>
<td>16.5</td>
<td>8.0</td>
<td>17.1</td>
<td>7.0</td>
</tr>
</tbody>
</table>

While falls account for around 3% of both admissions and FCEs, 6% of bed days are due to falls (table 15; appendix 13.4). NHS Wales financial returns estimate that the average cost per hospital bed day is £361.83 (Macey, 2008), meaning that, in crude terms, general falls cost NHS Wales £88.8M in in-patient bed days alone.

---

\(^9\) Length of stay refers to the total length of the ‘spell’, which is a continuous period of in-patient care. Bed days are the total number of days that patients in any given group occupied hospital beds for in any given financial year.
Table 15: Injury and falls bed days and estimated costs

<table>
<thead>
<tr>
<th></th>
<th>Average</th>
<th>Estimated cost @£361.83 per bed day (£M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total beddays</td>
<td>4116367</td>
<td>£1,489.4</td>
</tr>
<tr>
<td>Total beddays for injuries</td>
<td>549954</td>
<td>£199.0</td>
</tr>
<tr>
<td>Beddays - all falls</td>
<td>255424</td>
<td>£92.4</td>
</tr>
<tr>
<td>Beddays - general falls</td>
<td>245386</td>
<td>£88.8</td>
</tr>
<tr>
<td>General falls as a % of total</td>
<td>6.0%</td>
<td></td>
</tr>
<tr>
<td>General falls as a % of total for injuries</td>
<td>44.6%</td>
<td></td>
</tr>
<tr>
<td>General falls as a % of all falls</td>
<td>96.1%</td>
<td></td>
</tr>
</tbody>
</table>

A crude estimate of bed days per admission highlights the excess burden upon the NHS of falls and shows that they account for around 23.2 bed days per admission (table 16).

Table 16: Mean bed days per admission

<table>
<thead>
<tr>
<th></th>
<th>Admissions</th>
<th>Beddays</th>
<th>Bed days per admission</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>390728</td>
<td>4116367</td>
<td>10.5</td>
</tr>
<tr>
<td>Injury admissions</td>
<td>33714</td>
<td>549954</td>
<td>16.3</td>
</tr>
<tr>
<td>Total falls</td>
<td>11785</td>
<td>255424</td>
<td>21.7</td>
</tr>
<tr>
<td>General falls</td>
<td>10591</td>
<td>245386</td>
<td>23.2</td>
</tr>
</tbody>
</table>

4.5.7 Implications for prevention – in-patient admissions

Therefore, the contribution of injuries, specifically falls, to the burden of in-patient admissions is substantial. However, efforts to prevent falls need to be mindful that although they are a large part of the in-patient burden, preventing sufficient numbers to impact upon the entire burden is likely to be very difficult.

Prevention efforts would need to be on many levels to reduce the in-patient burden of falls, but reduction of falls admissions by, for example, 25% will still only reduce the overall in-patient burden by 0.7% (table 17). However, the cost saving would be around £22M, with 61,000 bed days avoided. This must still be considered against the growth in the older population.
Table 17:- Effect of prevention on falls admissions, injury admissions and all admissions

<table>
<thead>
<tr>
<th></th>
<th>Current</th>
<th>5% effect of prevention</th>
<th>25% effect of prevention</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Average</td>
<td>n</td>
<td>% Admissions occurring</td>
</tr>
<tr>
<td>All admissions</td>
<td>390728</td>
<td>390198</td>
<td>99.9%</td>
</tr>
<tr>
<td>Injury admissions</td>
<td>33714</td>
<td>33184</td>
<td>98.4%</td>
</tr>
<tr>
<td>Total falls</td>
<td>11785</td>
<td>11255</td>
<td>95.5%</td>
</tr>
<tr>
<td>General falls</td>
<td>10591</td>
<td>10061</td>
<td>95.0%</td>
</tr>
<tr>
<td>General fall admissions prevented pa - mean</td>
<td>530</td>
<td>2648</td>
<td></td>
</tr>
<tr>
<td>Mean bed days per admission</td>
<td>23.2</td>
<td>23.2</td>
<td></td>
</tr>
<tr>
<td>Mean bed days avoided</td>
<td>12296</td>
<td>61434</td>
<td></td>
</tr>
<tr>
<td>Cost saving (@£361.83 per bed day; £M)</td>
<td>£4.4</td>
<td>£22.2</td>
<td></td>
</tr>
</tbody>
</table>

Tertiary prevention to reduce numbers of bed days also appears to have the potential to reduce the overall burden of falls since the direct effect would be in the in-patient setting. Based on a crude estimate, reducing numbers of falls bed days by 1 day per admission would reduce the in-patient bed day burden by 0.3% (table 18).

Table 18:- Effect of prevention / intervention on bed days per admission

<table>
<thead>
<tr>
<th></th>
<th>Admissions</th>
<th>Beddays per admission</th>
<th>Beddays by 0.5 per general fall admission</th>
<th>Beddays by 1 per general fall admission</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Total</td>
<td>390728</td>
<td>4116367</td>
<td>10.5</td>
<td>4111072</td>
</tr>
<tr>
<td>Injury admissions</td>
<td>33714</td>
<td>549954</td>
<td>16.3</td>
<td>544658</td>
</tr>
<tr>
<td>Total falls</td>
<td>11785</td>
<td>255424</td>
<td>21.7</td>
<td>250128</td>
</tr>
<tr>
<td>General falls</td>
<td>10591</td>
<td>245386</td>
<td>23.2</td>
<td>240090</td>
</tr>
<tr>
<td>Change in total beddys</td>
<td></td>
<td>5296</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost saving</td>
<td></td>
<td>£1.92</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Reducing bed days by 0.5 per general fall admission would save around £1.9M per annum, while reducing bed days by 1 per general fall admission would save around £3.8M per annum.

Combining these data to estimate the overall effect of reducing admissions and numbers of bed days emphasises that there is a need to intervene at all levels in order to start to bring about substantial effects on admissions and bed days (table 19). A 5 per cent reduction in general fall admissions combined with a 0.5 day reduction in the number of bed days per admission leads to a negligible reduction in all admissions and just a 0.4% reduction in bed days per year. The cost saving is estimated to be around £6.1M.

### Table 19: Effect of prevention / intervention on bed days per admission

<table>
<thead>
<tr>
<th></th>
<th>Current averages</th>
<th>5% reduction in general falls admissions, 0.5 day reduction in bed days</th>
<th>25% reduction in general falls admissions, 1 day reduction in bed days</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Admissions</td>
<td>Beddays per admission</td>
<td>Beddays</td>
</tr>
<tr>
<td>Total</td>
<td>390728</td>
<td>411637</td>
<td>10.5</td>
</tr>
<tr>
<td>All injuries</td>
<td>33714</td>
<td>549954</td>
<td>16.3</td>
</tr>
<tr>
<td>Total falls</td>
<td>11785</td>
<td>255424</td>
<td>21.7</td>
</tr>
<tr>
<td>General falls</td>
<td>10591</td>
<td>245386</td>
<td>23.2</td>
</tr>
<tr>
<td>Mean bed days</td>
<td></td>
<td></td>
<td>23.2</td>
</tr>
<tr>
<td>Change in bed days</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>530</td>
<td>16991</td>
<td>2648</td>
</tr>
<tr>
<td>Cost saving (@£361.83 per bed day; £M)</td>
<td></td>
<td>£6.1</td>
<td></td>
</tr>
</tbody>
</table>

4.5.8 Deprivation analysis

Admission rates increase with increasing deprivation for both females and males (figure 8). For females, rates for the most deprived were around 1.3 times higher than those of the most affluent (95%CI 1.2 to 1.4; appendix 13.5). For the most deprived males, the inequalities gap was slightly larger, at around 1.4 times the most affluent (95%CI 1.3 to 1.5; appendix 13.5). Generally, the trend in inequalities showed no change between 2005 and 2009.
Figure 8: Deprivation related trends in fall admission rates

Ideally, further analysis would be carried out by health board to better target and prioritise interventions. Such data were not available for these analysis.

4.5.9 Comments based on the literature

These data are based on in-patient admissions coded as falls. An alternative approach would have been to have analysed injury admissions. However, they may have resulted from a variety of events, not just falls.

It is known that around 10% of hospital discharges in England and Wales that include an injury code (ICD-10 S or T code) lacks an external cause code (Lyons et al, 2008).

This means that these data are likely to underestimate the true numbers of falls that require inpatient treatment.

However, analysis of hip fractures in England and Wales has shown that increases in numbers of hip fracture FCEs have occurred in recent years while the incidence of hip fractures has shown little overall change (Brophy et al, 2006). Investigating the reasons behind such changes may be useful to determining whether intervention is possible and necessary; for example, the increase in FCEs may be due increasing age and complexity of hip fracture patients.

4.5.10 Summary

There are, on average, 1000 admissions, per day, of Welsh residents to hospital. Around 100 of these are due to injury, with 29 due to ‘general falls’.

Reducing the numbers of injurious falls that require hospital admission will reduce burden on in-patient services, but, greater gains are predicted by reducing lengths of stay of those admitted to hospital.
Tertiary prevention is therefore important, as is delivery of appropriate care at appropriate time and co-ordination of multi-disciplinary teams to ensure that discharge is not delayed.

The primary target for interventions is people over the age of 60, in particular over 75 year olds, and women.

These data underestimate falls and the burden of falls on NHS in-patient services.
4.6 Wales - Emergency Department burden

4.6.1 National data - methods

Emergency department (ED) data were obtained from the All Wales Injuries Surveillance System (AWISS).

Data for Welsh residents aged 60+ and attending an ED between 1/4/2009 and 31/3/2010 were obtained.

AWISS does not currently cover all of Wales, so estimates were made based on the population size covered.

ED systems do not use ICD-10 codes. Therefore, identification of falls is based on either use of an ED system code for ‘fall’ or the use of the word ‘fall’ in the injury narrative. However, one third of ED records do not have any information on the mechanism of injury. These data are therefore likely to be a considerable underestimate of the true numbers.

No longitudinal data were available for trend analysis.

4.6.2 National data

During the year analysed, an estimated 12,600 over 60 year old Welsh residents attended an ED for treatment of a fall related injury. This is consistent with the lower level estimates for the incidence of fall related injuries in Wales (table 3), but, as stated above, is likely to be a considerable underestimate of true falls related ED attendance.

4.7 Data inconsistencies

One purpose of this document was to try to clarify the epidemiology of falls in Wales. However, even just a brief review of the data, from a variety of different sources, highlights the difficulties with doing this (table 19).

In Wales, efforts are being made to improve ED data quality by analysing narrative to identify fallers. In-patient data would need improvements in coding of all injuries, including falls, to improve data accuracy. However, probably of greatest concern are the discrepancies in deaths due to falls. All of these issues mean that the mortality and morbidity associated with falls is difficult to assess. This then creates problems with assessing the cost and effectiveness of interventions.
Table 20: Summary of falls epidemiology based on various sources.

<table>
<thead>
<tr>
<th>Document section</th>
<th>Reference</th>
<th>Time period</th>
<th>Data source</th>
<th>Age group</th>
<th>Numbers of falls</th>
<th>Geography</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 Background</td>
<td>Gribben et al (2009)</td>
<td>??</td>
<td>GP data</td>
<td>60+ years</td>
<td>475,000 per annum</td>
<td>UK</td>
<td>This figure appears to be a gross under estimate</td>
</tr>
<tr>
<td></td>
<td>Scuffman (2003)</td>
<td>1999</td>
<td>A and E attendances</td>
<td>60+ years</td>
<td>647,721 pa</td>
<td>UK</td>
<td>Data now over 12 years old, figures would be expected to be substantially higher</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>IP admissions</td>
<td>60+ years</td>
<td>204,424 pa</td>
<td>UK</td>
<td></td>
</tr>
<tr>
<td>4.2 Incidence of falls</td>
<td>Our estimates (see section for references)</td>
<td>2010</td>
<td>Population falls</td>
<td>60+ years</td>
<td>230,000 to 460,000</td>
<td>Wales</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Population injury falls (fracture, head injury, serious laceration)</td>
<td>60+ years</td>
<td>11,500 to 45,900</td>
<td>Wales</td>
<td></td>
</tr>
<tr>
<td>4.3 Fall related mortality</td>
<td>Stats Wales</td>
<td>2001-2006</td>
<td>Falls deaths</td>
<td>All ages</td>
<td>Approx 200 pa</td>
<td>Wales</td>
<td>Probably in line with ONS data, but based on Lyons et al (2005) gross underestimate</td>
</tr>
<tr>
<td></td>
<td>Lyons et al (2005)</td>
<td></td>
<td>Hip fracture deaths</td>
<td>All ages</td>
<td>10,800 pa expected</td>
<td>England and Wales</td>
<td></td>
</tr>
<tr>
<td>4.4 In-patient burden</td>
<td>PEDW</td>
<td>2005/06 to 2008/09</td>
<td>Falls admissions</td>
<td>All ages</td>
<td>Average 21,000 pa</td>
<td>Wales</td>
<td>Assuming increases in Scuffman (2003) over time, figures appear to be in right area. Plus fit with epidemiological estimates of injury falls (section 3.2)</td>
</tr>
<tr>
<td></td>
<td>Falls FCEs</td>
<td>60+ years</td>
<td>Average 15,260 pa</td>
<td>Wales</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.5 ED burden</td>
<td>ED data</td>
<td>2009/10</td>
<td>Falls attendances</td>
<td>60+ years</td>
<td>12,600</td>
<td>Wales</td>
<td>Appears to be a considerable underestimate, especially when compared with Scuffman (2003) above</td>
</tr>
</tbody>
</table>
4.8 Epidemiological conclusions

Falls are a common and serious problem, particularly amongst older people. They place a significant burden on health and health services, and serious fall injuries, such as hip fracture, reduce quality of life dramatically.

Based on the population structure, it is estimated that between 230,000 and 460,000 over 60 year olds fall in Wales each year. Between 11,500 and 45,900 of these suffer serious injury. With predicted increases in the aging population, this will rise to between 12,400 and 49,400 by 2015. The biggest impact will be in Powys, which has the largest proportion of the population aged over 60.

There are around 200 fall related deaths in Wales each year and deaths increase with increasing age.

Injury accounts for around 2.8% of all hospital admissions, with general falls accounting for around one third of these. There has been no change in numbers of fall related admissions over recent years.

The majority of finished consultant episodes (FCEs) for falls are for women and over 60 year olds account for around 65% of fall FCEs.

Lengths of stay following a fall are considerably longer than for other conditions; up to 6 day difference in the median in some cases. Based only upon bed days, it can be estimated that falls cost £89M per year in Wales.

Prevention will have some impact on the overall in-patient burden, but the obvious priority should be to reduce lengths of stay following a falls admission. Reduction in numbers of falls that result in injury and require admission is also important, but will have less of an impact on secondary care.

There is a suggestion that targeting the most deprived should be a priority, but given the burden of falls, a universal approach is likely to be most useful and beneficial.

The emergency department burden is difficult to quantify and the data presented here are likely to underestimate the problem. However, the burden will increase in the future with increases in the aging population.
5 Evidence for interventions

Falls interventions for use in Wales therefore need to be identified across primary, secondary and tertiary levels of prevention.

Interventions for which there is good evidence of effectiveness need to be considered in terms of effect size, cost of implementation and the potential for negative outcomes, for example, readmission or increases in falls.

This document focuses on community strategies to reduce falls risk. It is loosely structured using the NICE clinical practice guidelines for the assessment and prevention of falls. Where possible and appropriate, the guidance is then updated with more recent evidence.

Although the importance of tertiary prevention and reduction in numbers of bed days associated with falling has been highlighted in the epidemiology section, review of effective strategies to manage this is beyond the scope of this document.

5.1 Individual assessment of falls risk

In 2004, NICE produced clinical practice guidelines for the assessment and prevention of falls in older people (NICE, 2004). The guidelines cover evidence published up until October 2003. This guidance forms the basis of this review.\(^\text{10}\)

ProFaNE is the Prevention of Falls Network Europe and has produced a clinical assessment tool (CAT).\(^\text{11}\) This tool helps to guide health care professionals through the identification and assessment of those at risk of falling and the provision of interventions.

Using the structure provided by NICE, this section works through these guidelines discussing how they could be implemented in practice.

The information from NICE was then supplemented by 2011 guidance from the American Geriatrics Society / British Geriatrics Society

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\(^{10}\) NICE (2004) covers only primary and secondary prevention of falls, that is, identifying fallers and those at risk of falling, assessing risk and intervening if necessary. It does not cover the management of fallers immediately following a fall, for example, in-patient management and care.

\(^{11}\) ProFaNE. Clinical Assessment Tool (CAT) [http://www.profane.eu.org/CAT/] Accessed 26 October 2010
(AGS/BGS) joint statement and by information from CAT, as well as information from primary research published in peer reviewed journals.

5.1.1 Defining ‘older people’

**NICE (2004) Guideline**

The NICE guidance defines older people as those aged over 65 years, ProFaNE does not appear to have defined a target age. AGS / BGS define older people as being over 65 years.

**Commentary**

The actual age group considered to be at high risk in Wales needs to be discussed further, based on the epidemiological evidence and the approach taken to delivering services.

The evidence presented in section 3 of this document suggests that 60 plus years would be an appropriate target for intervention. However, it may be most appropriate to take a stepwise approach to this, depending on the identified interventions; for example, beginning by targeting over 75 year olds only, expanding to cover over 70 year olds after 1 year and so on.

5.1.2 Case / risk identification

**NICE (2004) Guideline**

“Older people in contact with health care professionals should be asked routinely whether they have fallen in the past year and asked about the frequency, context and characteristics of the falls”.

Recommendation grade C\textsuperscript{12}, level of evidence III\textsuperscript{13}

**Commentary**

NICE (2004), based on AGS / BGS define a fall as “an event whereby an individual comes to rest on the ground or another lower level with or without loss of consciousness” (AGS / BGS, 2001).

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\textsuperscript{12} Grade C – directly based on level III evidence or extrapolated recommendation from level I or II evidence (NICE, 2004).

\textsuperscript{13} Evidence from non-experimental descriptive studies, such as comparative, correlational and case control studies (NICE, 2004)
The evidence suggests that a previous fall is a significant predictor of a subsequent fall (Northridge et al, 1996; Covinsky et al, 2001; Tromp et al, 2001; Friedman et al, 2002; Stenbacka et al, 2002; Wood et al 2002, Ganz et al, 2007). NICE (2004) report a relative risk (RR) of subsequent fall of 1.5 to 4.0, but state that the study reporting the RR of 4.0 was of low quality. ProFaNE cite a likelihood ratio of subsequent fall of 2.3 to 2.8.

The NICE guideline development group was in support of older people being asked about falls risk on a yearly basis, but did not want to make this a specific recommendation (NICE, 2004). Lamb et al (2007) interpret this as meaning that screening should be undertaken on an annual basis. The 2006 NSF for Older People in Wales (WAG, 2006) also reiterates this guidance and explicitly states that older people should be asked about falls once a year.

In 2010, a joint guideline by the British Geriatrics Society (BGS) and American Geriatrics Society (AGS), to replace that issued by both societies along with the American Academy of Orthopaedic Surgeons in 2001, emphasised that primary care physicians should annually screen all older patients to identify those suffering recurring falls or having difficulty in walking, that is, those at risk of falling. This guideline was endorsed by the American Medical Association, the American Occupational Therapy Associated and the American Physical Therapy Association.

This guideline is therefore consistent with the position taken by NICE, but advances it to a specific recommendation. In addition, it gives greater direction on where and by whom the assessment should be carried out.

It has also been stated that “the incidence of falls is sufficiently high and the risk factors for falls sufficiently well known, for it to be feasible for falls programmes to be delivered to those identified through screening” (Irvine et al, 2010). The rationale for this statement is based on a multicentre RCT involving over 70 year olds in Nottingham, UK. In this trial, community dwelling older people were screened to identify those at high risk of falling. Falls prevention was then delivered at a day hospital.

The trial used the Falls Risk Assessment Tool (FRAT). There was a reduction in falls in the treatment arm, but this was not statistically significant (Intervention falls rate 2.07 (95%CI 0 to 12) v control 2.24 (95%CI 0 to 16)). More detailed discussion of this study and of cost effectiveness is presented in the appropriate section. The authors concluded that falls provision following screening was plausible and could well be clinically effective.

Logically, a screening question could be asked opportunistically during any contact between a patient and health care provider, whether primary, secondary, community or unscheduled. This would then identify those at high risk of falling and these people could then be referred for more
detailed assessment. However, this would then require at risk patients to attend for assessment, with them being at high risk of falling between identification and assessment. Such an approach also risks some people at high risk being ‘missed’. A systematic approach would be the only way to avoid this.

For ProFaNE, the process of case identification forms part of their Level 1 assessment. Levels 1 and 2 form a basic assessment package, described here and based on the key falls risk factors identified by NICE and ProFaNE.

Based on the comments from the NICE guideline development group, the assessment processes described by NICE, and the practicalities of carrying out assessments, it seems reasonable to recommend carrying out an annual falls assessment in primary care.

It may be most sensible for primary care to run specific falls assessment clinics, inviting people over the age of 60 in for an assessment on a regular basis, in the same way that invitations for flu vaccines are made. This would then allow for many of the basic assessments required to be carried out and would also simplify and streamline referrals. Those identified as being at highest risk could then be referred on to falls clinics. While many areas may have falls clinics, the current practice is generally for these to manage fallers who have received medical treatment following injury. Capacity issues may make this difficult to manage in the short term, but the long term intention would be for clinics to carry out more primary prevention, reducing their need for a secondary / tertiary prevention role.

This creates a proactive approach to falls risk identification. Current approaches are reactive and are based on people already having fallen and presenting for medical attention following a fall, therefore requiring a burden to be created, before it can be managed and reduced (figure 5).

**Next steps**

Formal ‘screening’ or assessment clinics to which patients are routinely invited seem a more logical and robust approach than opportunistic assessments. This is also consistent with current guidance

A pilot programme based in primary care could be established. Screening should be organised in primary care, with assessment and intervention either also in primary care or in a dedicated falls clinic setting in secondary care.
5.1.3 Fallers and those at risk of falling

**NICE (2004) Guideline**

“Older people reporting a fall or considered at risk of falling should be observed for balance and gait deficits and considered for their ability to benefit from interventions to improve strength and balance”

Recommendation grade C\(^{14}\), level of evidence I\(^{15}\) and III\(^{16}\)

**Commentary**

Interventions to improve gait and balance have been demonstrated to bring about reduction in falls (NICE, 2004). In addition, mobility impairment, gait disorders and balance deficits have been shown to be associated with falls risk. Tests to assess these factors are available.

5.1.4 Case / risk identification process

An assessment process, covering both sections 5.1.2 and 5.1.3, adapted from NICE (2004) and ProFaNE is shown in figure 9.

There are a number of options for the actual question used to begin the process. Gillespie et al (2010) recommend “In the past month, have you had any fall, including a slip or trip, in which you lost your balance and landed on the floor or ground or lower level?” NICE recommend referring to the past year and this is reflected in the simple question used by ProFaNE “Have you fallen in the past year?” Prompts could include “what about any slips or trips where you have lost your balance?”

Given that most people, of all ages, lose their balance, the Gillespie question may be over-sensitive, while the ProFaNE question may be lacking in sensitivity. Striking a balance between sensitivity and specificity of the question and identifying the truly high risk is a key to delivering an appropriate and sustainable service.

However, it is suggested that even those at low risk should be considered for a general population intervention to improve balance. This may be a ‘trade off’ against the use of a more general question.

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\(^{14}\) Grade C – directly based on level III evidence or extrapolated recommendation from level I or II evidence (NICE, 2004)

\(^{15}\) Evidence from meta analysis of RCTs or at least one RCT

\(^{16}\) Evidence from non-experimental descriptive studies, such as comparative, correlational and case control studies (NICE, 2004)
There are a number of possible approaches to the gait and balance assessment, ranging from a simple question to one of a number of simple balance tests (figure 10). The tests shown in the algorithm are taken from ProFaNE. NICE also suggests a number of simple tests (table 20), with the timed up and go test common to both approaches. ‘Timed up and go’ is also mentioned by AGS/BGS (2010) as a suitable test, along with ‘Get up and go’, Berg balance and performance oriented mobility. The methods for the tests shown in the algorithm are given in appendix 13.6.

Realistically, the “timed get up and go” test seems most appropriate for use in screening context. It also seems most feasible for use in an assessment process.
Figure 10: Proposed algorithm for balance and gait screening of older people for falls risk in primary care (adapted from NICE (2004) and ProFaNE)

Gait and balance assessment

Assessment options

Do you have any problems with walking or balance?

No

Yes

Consider general population intervention

No further action at this time – recall in 1 year

Screening tests

No gold standard, simple balance tests

Timed up and go (Whitney et al, 2005)

Sits to stand test (Guralnik et al, 1984)

Near tandem standing test

Completes in under 10s (community), 15s (more frail)

Completes in more than 10s (community, 15s (more frail)

Stands for less than 10s

Stands for 10s+

Consider general population intervention

No further action at this time – recall in 1 year

Completes in under 12s

Completes in more than 12s

Consider general population intervention

No further action at this time – recall in 1 year

Completes in under 10s (community), 15s (more frail)

Completes in more than 10s (community, 15s (more frail)

Consider general population intervention

No further action at this time – recall in 1 year

At high risk of falling, carry out Falls risk assessment
### Table 21: Balance and gait assessment tools

<table>
<thead>
<tr>
<th>Tool</th>
<th>Turn 180</th>
<th>Berg</th>
<th>Dynamic gait</th>
<th>Functional reach test</th>
<th>Performance assessment</th>
<th>Timed get up and go</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setting</td>
<td>Hospital and community</td>
<td>All</td>
<td>All</td>
<td>All</td>
<td>All</td>
<td>All</td>
</tr>
<tr>
<td>Population</td>
<td>Over 75s</td>
<td>Ambulatory elderly</td>
<td>Ambulatory elderly</td>
<td>Ambulatory elderly</td>
<td>Ambulatory elderly</td>
<td>Ambulatory elderly</td>
</tr>
<tr>
<td>Test</td>
<td>Stand, and on request, turn 180 degrees without using supports</td>
<td>14 everyday movements assessed, including picking an object up from the floor, bed to chair transfer</td>
<td>Assessment on ability to perform 6 actions including stepping over objects, stair climbing</td>
<td>Assessment of difference between arms length and maximum reach</td>
<td>Assessment of balance while performing actions including reaching object from high shelf, standing and sitting</td>
<td>Stand, walk 3m, turn around, return to chair and sit down</td>
</tr>
<tr>
<td>Time needed</td>
<td>Test is not timed</td>
<td>15 minutes</td>
<td>15 minutes</td>
<td>1 to 2 minutes</td>
<td>10 minutes</td>
<td>1 to 3 minutes</td>
</tr>
<tr>
<td>Assessment</td>
<td>Counting steps taken to turn 180</td>
<td>Scale of 0 to 56, with sub-scales</td>
<td>Observer grades each test 0 to 3, total score out of 24</td>
<td>Distance reached</td>
<td>Short scale 0-28, long 0-40</td>
<td>Time taken and observer assessment of fall risk</td>
</tr>
<tr>
<td>Equipment needed</td>
<td>None</td>
<td>Stopwatch, chair, bed, ruler, stool</td>
<td>Stairs</td>
<td>Force platform or yardstick</td>
<td>Stopwatch, chair, 5lb object, high shelf, 15ft walkway</td>
<td>Stopwatch, chair, 3m walkway</td>
</tr>
<tr>
<td>Training</td>
<td>None</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Acceptability</td>
<td>12.7% experienced a fear of falling</td>
<td>Not known</td>
<td>Not known</td>
<td>Not known</td>
<td>Not known</td>
<td>Not known</td>
</tr>
<tr>
<td>Cut-off</td>
<td>More than 4 steps is associated with increased falls risk</td>
<td>Score of 45 stated to indicate independently safe</td>
<td>Less than 19 indicates risk</td>
<td>Less than 6in or 15cm indicates falls risk</td>
<td>over 18 on short scale predicts falls,</td>
<td>Various - 10 to 16 seconds</td>
</tr>
<tr>
<td>Conclusions</td>
<td>No evaluations identified</td>
<td>Detailed, extensively tested, but time consuming</td>
<td>Lack of testing, full gait assessment, time consuming</td>
<td>Only assesses reach</td>
<td>Assesses balance and performace, burden to patients</td>
<td>Appears to have clinical utility based on time and burden to assessor and patient</td>
</tr>
</tbody>
</table>

**PHW**

- **Not appropriate - limited use in younger populations**
- **Could be carried out in primary care setting, but likely to be costly to implement**
- **Not appropriate - needs stairs**
- **Not appropriate - limited and needs specialist equipment**
- **Not appropriate - equipment needs**

**Source:** NICE, 2004
5.1.5 Outcomes of screening process

This screening process (suggested reporting form appendix 13.7) should classify people either as ‘having fallen or at high risk of falling’ or as ‘low risk of falling’ (figure 11).

Figure 11: Proposed algorithm for balance and gait screening of older people for falls risk in primary care (adapted from NICE (2004) and ProFaNE)

Older people living in Wales

Primary care

Falls case identification process

Low risk of falling

Consider general population intervention

No further action at this time – recall in 1 year

Faller or at risk of falling

Falls risk assessment

Those at ‘low risk of falling’ should be considered for a general population intervention (section 5.2.1).

Those who have ‘fallen or are at high risk of falling’ should then enter a second, multi-factorial stage of risk assessment (section 5.1.6).
5.1.6 Multi-factorial falls risk assessment

**NICE (2004) Guideline**

“Older people who present for medical attention because of a fall, or report recurrent falls in the past year, or demonstrate abnormalities of gait and/or balance should be offered a multi-factorial falls risk assessment. This assessment should be performed by a health care professional with appropriate skills and experience, normally in the setting of a specialist falls service. This assessment should be part of an individualised, multi-factorial intervention.”

“Multi-factorial assessment may include the following:
- Identification of falls history
- Assessment of gait, balance and mobility and muscle weakness
- Assessment of osteoporosis risk
- Assessment of the older person’s perceived functional ability and fear related to falling
- Assessment of visual impairment
- Assessment of cognitive impairment and neurological examination
- Assessment of urinary incontinence
- Assessment of home hazards
- Cardiovascular examination and medication review”.

Recommendation grade C, level of evidence III

**Commentary**

The ideal components of a multi-factorial assessment are a subject of much debate. There is no gold standard assessment.

NICE lists the elements as above, ProFaNE splits a similar group of assessments into 3 levels, a basic multi-factorial assessment, a comprehensive geriatric assessment and a high level, detailed assessment. The basic multi-factorial assessment can be, and is intended to be, carried out in primary care. The comprehensive geriatric assessment is for a geriatrics specialist to carry out, most likely a geriatrician. The high level assessment requires contributions from appropriate specialists such as occupational therapy or cardiology.

The Falls Risk Assessment Tool (FRAT) is a popular risk assessment tool, but assesses only 5 elements; falls history, 4+ medications, history of stroke or Parkinson’s Disease, balance problems and the sit to stand test. The intention is that problems in any of these areas should prompt referral

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17 Grade C – directly based on level III evidence or extrapolated recommendation from level I or II evidence (NICE, 2004)
Evidence from non-experimental descriptive studies, such as comparative, correlational and case control studies (NICE, 2004)
to a falls clinic. In some cases, FRAT is used more as a screening than assessment tool (Irvine et al, 2010).

How the delivery of multi-factorial assessment and intervention is managed is the subject of debate. ProFaNE recommends an approach based largely in primary care with onward referral for the highest risk or for management of specific risk factors (figure 12). NICE merely highlights the need to carry out such assessment, rather than discussing who should carry out the assessment and where this should take place.

**Figure 12:- Proposed algorithm for basic risk assessment for use in primary care for those at high risk of falling (adapted from ProFaNE and NICE)**
5.1.7 Gait and balance assessment

NICE (2004) found that gait problems significantly increase falling, with odds ratios from 2.0 to 2.2 (Koski et al., 1998; Cesari et al., 2002; Northridge et al., 1996). However, a number of other studies have found that while gait deficits are associated with increased risk of falling, the increase was not significant (NICE, 2004). Gait measurement and analysis differed across each of the studies.

Increased risk of falling associated with balance problems ranged from 1.8 to 3.9 (significant; NICE, 2004), but again, other studies found no significant increase in risk. Balance was again assessed in different ways in different studies.

The gait and balance assessment process is shown in figures 13 and 14.

Foot and footwear are also linked to gait and balance problems and therefore increased risk of falling (AGS / BGS, 2011). Serious foot problems, such as bunions, toe deformities, ulcers or deformed nails, increase falls risk (Tinetti et al., 1988). Poorly fitting footwear, worn soles, high heels and poor laces and buckles also increase falls risk (Rubenstein et al., 1988).
Figure 13: Proposed algorithm for balance and gait screening of older people for falls risk in primary care (adapted from NICE (2004) and ProFaNE)

Gait and balance assessment

Assessment options

Do you have any problems with walking or balance?

No

Consider general population intervention

Gait and / or balance problem identified (consider foot / footwear problems)

Reason for problem known

Check management, make changes if needed

Reason for problem not known

Balance / Exercise training programme

No gait and / or balance problem

Consider general population intervention

Gait problems increase risk of falling by 2.0 to 2.2 times
Balance problems increase risk of falling by 1.8 to 3.9 times

Screening tests

See screening test algorithm

Referral to specialist for further assessment if necessary
Figure 14: Proposed algorithm for gait and balance screening tests

Screening tests

1. Timed up and go (Whitney et al, 2005)
   - Completes in under 10s (community), 15s (more frail)
     - Consider general population intervention
   - Completes in more than 10s (community)

2. Sit to stand test (Guralnik et al, 1984)
   - Completes in more than 12s
     - Consider general population intervention
   - Completes in under 12s
     - Consider general population intervention

3. Near tandem standing test
   - Stands for less than 10s
     - Consider general population intervention
   - Stands for 10s+

Gait and/or balance problem
5.1.8 Medications review

NICE (2004) found that patients taking more than three to four medications were at 1.6 to 3.2 times greater risk of falling than patients taking fewer medications (figure 15). This was based on a meta-analysis and systematic review of studies including cohort, case control and cross sectional designs (Leipzig et al, 1999). ProFaNE also recommend medications review based on more than 4 medications. However, 2011 guidance from AGS/BGS suggests that all older people on medications, regardless of number, should be reviewed and reduction or withdrawal attempted or carried out (AGS/BGS, 2011). This is based on at least fair evidence that the intervention would improve health outcomes (AGS/BGS, 2011). They also suggested that the strongest risks were associated with psychotropic medications and polypharmacy.

**Figure 15: Proposed algorithm for medications review**
5.1.9 Vision assessment

Vision problems have been identified as increasing falls risk, with studies reporting significant odds ratios of 1.2 to 2.3 (Northridge et al, 1996; Koski et al, 1998; figure 16).

Figure 16: Proposed algorithm for vision review

![Diagram showing the proposed algorithm for vision review]

- **Vision impairment**
  - Do you have any vision problems?
    - No: Vision not impaired; continue with risk assessment
    - Yes: Are you able to read a newspaper or watch tv?
      - No: Vision not impaired; continue with risk assessment
      - Yes: Vision impaired
        - Known cause
          - Refer for detailed / specialist vision assessment
        - Cause not known
          - Refer for detailed / specialist vision assessment

*This will reduce risk of further falls (Harwood et al, 2005)*

*If visual impairment is severe (6/24 or less in best eye with best correction), evidence suggests that an occupational therapy home visit with reduce the risk of further falls (Campbell et al, 2005).*

- **Vision problems increase falls risk by 1.2 to 2.3 times (Northridge et al, 1996; Koski et al, 1998)**

- **If cataracts are present, ensure surgery is expedited**
- **If visual impairment is severe (6/24) refer to occupational therapy**
5.1.10 Reasons for falling and falls history

The patient should be asked for a detailed description of the number of falls, their circumstances, symptoms, injuries and other consequences. Specifically, they should be asked to explain why they fell.

Examination of the reasons why a fall occurred may prompt further cardiovascular assessment, as recommended by NICE (2004). However, cardiovascular problems are not listed within the evidence statements accompanying the recommendation. ProFaNE also highlights the need to rule out cardiovascular causes of falls; citing syncope and hypertension as the two main concerns (figure 17).

**Figure 17: Proposed algorithm for reasons for falling review**

```
Can you explain why you fell?

Yes
No further action, continue with risk assessment

No

Refer for specialist assessment
```
5.1.11 Cognitive Impairment

Two community studies have concluded that cognitive impairment significantly increases risk of falling (OR 2.2 to 2.4; Tinetti et al, 1995; Van Schoor et al, 2002). However, in nine studies there was no significant effect of cognitive impairment on falls risk (see NICE, 2004).

While the studies quoted by NICE are inconclusive, the recommendation is that cognitive impairment is assessed as a falls risk factor (NICE, 2004; figure 18). ProFaNE cite the epidemiological evidence; Falls incidence is 70%-80%, with fractured neck of femur occurring in 5%-8% of the cognitively impaired population (Shaw et al, 2003; Van Dijk et al, 1993; Tinetti et al, 1988).

Figure 18: Proposed algorithm for cognitive impairment review

Have you noticed any problems with your / his / her memory or the way you / he / she behaves?

- Yes
  - Carry out MMSE
  - Score less than 24 out of 30: Cognitive impairment
    - Refer for further investigation, if not already being treated
  - Score more than 24 out of 30: No cognitive impairment
    - No further action, continue with falls risk assessment
- No
  - No further action, continue with falls risk assessment

Cognitive impairment significantly increases falls risk (OR 2.2 to 2.4, Tinetti et al, 1995; Van Schoor et al, 2002)
The increased incidence of falls in the cognitively impaired is associated with more gait and balance problems than in normal older people (Visser, 1983; Franssen et al, 1999; Waite et al, 2000), with prescription of psychotropic medications (Tinetti et al, 1988; Thapa et al, 1995) and greater prevalence of hypotension that is not due to medications (Campbell and Reinken, 1985; Passant et al, 1997).

However, even though incidence is higher, ProFaNE conclude there is a lack of direct evidence that falls prevention interventions are effective in this population.

In Sweden, a falls intervention programme was ineffective in a group with an MMSE (appendix 13.8) score below 19. The falls incidence rate ratio between the intervention and control groups was 1.05 (95%CI .84 to 1.30), but femoral fractures were significantly reduced in the intervention group (p .006) (Jensen et al, 2003; Jensen et al, 2002). Shaw et al (2003) found “no evidence of effect on falling” in a group with MMSE below 24 (RR 0.92, 95%CI 0.81 to 1.05), however, with the findings of borderline significance, such a definitive statement seems unwise. Schnelle et al (2003) studied nursing home residents (mean MMSE 12 to 14) and found that control group falls incidence rose from 14 episodes per 1000 resident weeks to 21, while in the intervention group incidence rose from 11 to 13, with no significant difference between the two groups at follow up (p .40). There is a lack of clarity in the paper over the sample size required and this was based on a reduction in negative health effects.


However, while the evidence of effect on falls was lacking, there is evidence that the cognitively impaired can comply with falls interventions, including multi-factorial interventions (Shaw et al, 2003), environmental and medication modifications (Ray et al, 1997), physical function training (Jensen et al, 2003) and exercise programmes with strength, gait and balance assessments (Brill et al, 1995).

As a result, risk factors have been modified, including gait score (at 3 months significant difference in gait scores between intervention and control groups (p=0.022)), environmental risk factors (at 3 months significant difference p <.001) (Shaw et al, 2003) and walking, mobility and static balance (Toulotte et al, 2003; Pomeroy, 1993).

The level at which cognitive impairment prevents involvement in falls prevention interventions is not clear, but ProFaNE make a ‘pragmatic recommendation’ that at an MMSE of >20, assessment and intervention should continue as for cognitively normal cases. This is based on successful interventions in community populations with MMSE of 20 or
more (Tinetti et al, 1994) and residential care populations with an MMSE of 19 or more (Jensen et al, 2002; Jensen et al, 2003).

ProFaNE have produced a series of pragmatic recommendations for managing cognitively impaired older people in terms of falls risk. The position on which these recommendations are based is that when resources are scarce, cognitively normal people should be prioritised because of the proven evidence of effectiveness.

The recommendations are:-

- At an MMSE score of greater than 20, assessment and intervention should progress as for the cognitively normal.
- Medication review should be undertaken in those with cognitive impairment and dementia
- Orthostatic hypotension is a common risk factor for falls in older people with dementia
- Physical training programmes may be beneficial
- Environmental recommendations are applicable regardless of cognitive function
- Alarm devices may be appropriate in some circumstances
- Calcium and vitamin D replacement may have a role in falls prevention, but further studies are required to confirm the findings on which this recommendation is based.

AGS / BGS (2011) agree that there is insufficient evidence to intervene with the cognitively impaired.
5.1.12 Depression

Although not included in the NICE list of risk factors for assessment, depression is listed by ProFaNE as a risk factor for falls and one which may affect uptake or and adherence to interventions (figure 19; appendix 13.9).

Figure 19: Proposed algorithm for depression review

```
Do you feel your life is empty?

No

No depression suspected

No further action, continue with risk assessment

Yes

Depression suspected

Administer geriatric depression scale (Short Form)

Score 5+

Depression suggested – consider specialist assessment and intervention

Score 4 or less

Normal, no further action, continue with risk assessment
```
5.1.13 Dizziness

NICE includes reference to dizziness within the section on balance deficit, rather than as a risk factor in its own right.

ProFaNE acknowledge that it is a non-specific term, that it may provide clues to reasons for falling, but that causes need to be identified (figure 20).

Figure 20:- Proposed algorithm for dizziness review

```
Have you had any dizziness associated with falling?

No

No further action, continue with risk assessment

Yes

Discuss the nature of the dizziness to determine the most likely cause

Head or room spinning

Symptoms of vertigo

Refer for appropriate further specialist assessment

Fainting or feeling faint

Syncopal or presyncopal symptoms

Light headed when standing from sitting or lying (postural hypotension)

Postural symptoms

Feeling unsteady on feet

Symptoms of unsteadiness
```
5.1.14 Fear of falling

Fear of falling may be measured in a wide variety of ways, with summary findings of 1.5 to 3.2 (statistically significant) reported for a series of community studies (Arfken et al, 1994; Cumming et al, 2000; Friedman et al, 2002; figure 21). However, while fear was a significant predictor of falls in a univariate analysis by Tromp et al (2001), it did not contribute significantly to the multivariate model.

Figure 21:- Proposed algorithm for fear of falling assessment

The fear of falls assessment tool, Falls Efficacy Scale (FES) was developed by Tinetti et al (1990). Since then, discussions about the validity and reliability have taken place and various modifications have been made. As a result, the FES-I (Falls Efficacy Scale – International; appendix 13.10) has been developed by the ProFaNE group, with European Commission funding. The FES-I has been found to be psychometrically sound and is recommended by ProFaNE for the assessment of fear of falling (Yardley et al, 2005).
Scores range from 16 (no fear of falling) to 64 (very afraid of falling), with a relatively small study by Kempen et al (2007) producing mean scores by age group for community dwelling older people in the Netherlands (figure 22). Until more detail on cut-offs for high and low risks are available, these are useful markers against which to measure fear.

**Figure 22:** Mean FES-I scores by age and sex (Kempen et al, 2007).

<table>
<thead>
<tr>
<th>Age</th>
<th>Male N</th>
<th>Mean</th>
<th>SD</th>
<th>Female N</th>
<th>Mean</th>
<th>SD</th>
<th>Total N</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>- 70-74</td>
<td>40</td>
<td>23.1</td>
<td>7.9</td>
<td>53</td>
<td>25.3</td>
<td>8.8</td>
<td>93</td>
<td>24.6</td>
<td>8.5</td>
</tr>
<tr>
<td>- 75-79</td>
<td>25</td>
<td>26.0</td>
<td>10.1</td>
<td>41</td>
<td>31.2</td>
<td>12.7</td>
<td>66</td>
<td>29.3</td>
<td>12.0</td>
</tr>
<tr>
<td>- 80+</td>
<td>17</td>
<td>28.9</td>
<td>11.5</td>
<td>37</td>
<td>34.3</td>
<td>12.8</td>
<td>54</td>
<td>32.5</td>
<td>12.5</td>
</tr>
<tr>
<td>Total sample</td>
<td>82</td>
<td>25.2</td>
<td>9.3</td>
<td>131</td>
<td>29.9</td>
<td>11.8</td>
<td>213</td>
<td>28.0</td>
<td>11.2</td>
</tr>
</tbody>
</table>
5.1.15 Other assessments

NICE also include continence and home hazards within their list of falls risk factors to be assessed.

NICE found that urinary incontinence was associated with falls risk (OR range 1.3 to 1.8; Tromp et al, 1998; Tromp et al, 2001; Brown et al, 2000), but also that it was not a significant predictor of falling (Tinetti et al, 1995; Koski et al, 1998; Brown et al, 2000; Cesari et al, 2002; Thapa et al, 1996).

Home hazards were found to increase risk of falling (OR 1.5, 95%CI 1.4 to 1.7; Cesari et al, 2002), with loose rugs and mats having a hazard ratio of 5.9 (95%CI 1.4 to 24.2) and carpet fold or tripping hazard with a hazard ratio of 3.45 (95%CI 1.3 to 9.3; Gill et al, 2000).

Although both are falls hazards, ProFaNE includes these assessments within the ‘higher’ level or specialist assessment required if an individual is found to have two or more of the lower level risk factors.

Given that it is being recommended that the lower level assessment is carried out in primary care, with referral for specialist assessment if necessary, inclusion of continence and hazard assessment in a higher level assessment is appropriate.
5.1.16 Management of the results of this assessment

The risk factors outlined for assessment here are therefore those deemed suitable for community assessment by ProFaNE.

NICE (2004) emphasises the need to carry out this assessment in the context of a Comprehensive Geriatric Assessment (CGA). This is managed by ProFaNE by considering the overall results of the assessment. The general approach is to manage 1 or 2 risk factors within primary care with specific referrals and interventions where appropriate, but where more than 2 risk factors are identified, to refer for a CGA, usually by a geriatrician (figure 23).

CGA\(^\text{18}\) is seen as a key element of geriatric medicine. It is defined as a multidimensional and usually interdisciplinary diagnostic process designed to determine a frail older person’s medical conditions, mental health, functional capacity and social circumstances\(^\text{18}\). It “addresses the diversity and complexity of older peoples needs. This encompasses their physical, social, psychological, economic, functional and environmental requirements. Consequently, problems in one or more areas can be tackled promptly and the appropriate management measures implemented.” (BGS, 2010)

Figure 23: Summary of how to manage findings of community based multi-factorial falls assessment

- **Risk factor assessment**
  - 1 or 2 risk factors (except if fear of falling is only risk factor – see fear of falling box)
  - Manage in primary care
    - Cognitive impairment
    - Impaired vision
    - Medication review
    - Fear of falling intervention
    - Gait or balance problems (cause known or referral not necessary)
  - Onwards referral
    - Gait or balance problems (cause unknown or referral necessary)
    - Unexplained falls
    - Dizziness
    - Depression
  - More than 2 risk factors
    - Comprehensive Geriatric Assessment
  - Fear of falling only risk factor identified
    - Consider population based intervention but otherwise, no further action
5.2 Intervention following falls risk assessment

Once the assessment has been carried out and the appropriate referrals and interventions identified, these then have to be delivered in a timely manner.

ProFaNE suggests that even where falls risk is very low, intervention is appropriate as part of a strategy to maintain a low risk.

5.2.1 General population intervention

People at low risk of falls have been found to benefit from general population level exercise interventions to reduce their risk of future fall (figure 24; Sherrington et al, 2008).

Figure 24:- Proposed algorithm for general population level interventions (adapted from ProFaNE)

![Algorithm Diagram]

It may not be practical to provide exercise in an NHS setting for the low risk without balance problems.

Exercise programmes
- e.g. Tai Chi (Li et al, 2005; Wolf et al, 1996; Voukelatos et al, 2007)

Self help (Yardley and Nyman, 2007)
- Balance training [http://www.balancetraining.org.uk/fallsAdvice/index.jsp](http://www.balancetraining.org.uk/fallsAdvice/index.jsp)

Obviously, exercise programmes should be tailored for the staff and facilities available. While there is good evidence for Tai Chi it is possible that instructors may not be available to offer such an intervention. In this case, other exercise programmes should be offered.
5.2.2 Multi-factorial interventions

**NICE (2004) Guideline**

“All older people with recurrent falls or assessed as being at increased risk of falling should be considered for an individualised multi-factorial intervention.

In successful multi-factorial intervention programmes the following specific components are common – against a background of general diagnosis and management of causes and recognised risk factors
- Strength and balance training
- Home hazard assessment and intervention
- Vision assessment and referral
- Medication review with modification / withdrawal”.

Recommendation grade A\(^{19}\), level of evidence I\(^{20}\)

**NICE (2004) Guideline**

“Following treatment for an injurious fall, older people should be offered a multi-disciplinary assessment to identify and address future risk and individualised intervention aimed at promoting independence and improving physical and psychological function”.

Recommendation grade A, level of evidence I

**Commentary**

The assessment process described in section 5.1, with 8 different components, will identify the appropriate risk factors that will allow for the development of an individual, specific intervention programme. As stated, the listed factors are common, however, ProFaNE does not include include home hazard and assessment within the general, level 2, community assessment. This is discussed further in section 5.2.5.

\(^{19}\) Directly based on evidence from RCTs and meta analysis of RCTs

\(^{20}\) Evidence from meta-analysis of RCTs or at least one RCT
5.2.3 Strength and balance training

**NICE (2004) Guideline**

“Strength and balance training is recommended. Those most likely to benefit are older community-dwelling people with a history of recurrent falls and / or balance and gait deficit. A muscle-strengthening and balance programme should be offered. This should be individually prescribed and monitored by an appropriately trained professional.”

Recommendation grade A\(^{21}\), Evidence grade I\(^{22}\).

**Commentary**

As stated above (section 5.1.7) identification of a balance or gait deficit should be followed by appropriate intervention. However, there is also evidence to support the use of exercise programmes in those at low risk of falling.

Tai chi appears to be particularly effective in those at low risk of falling (section 5.2.1; Li et al, 2005; Wolf et al, 1996; Voukelatos et al, 2007), but may be less effective in frailer older people at higher risk.

However, exercise training is effective at reducing falls risk in low and high risk populations (Sherrington et al, 2008) and the AGS/BGS (2011) also recommended that exercise training is an important part of a multi factorial intervention to prevent falls. This statement is based on ‘good evidence’.

The Otago exercise programme (OEP) is an individually delivered and tailored programme of muscle strengthening, balance training and walking reduced falls in women aged over 80 by 20% over 1 year (pooled RR 0.80, 95%CI 0.66 to 0.98; Campbell et al, 1997; Campbell et al, 1999; Robertson et al, 2001). It also reduced fall related injuries by 23% (pooled RR 0.67, 95%CI 0.51 to 0.89; Campbell et al, 1997; Campbell et al, 1999; Robertson et al, 2001).

Economic analysis showed that although delivery of the programme by a practice nurse was less costly than by a physiotherapist, it was also less effective at reducing in-patient costs.

Details of the programme are available at [http://www.acc.co.nz/preventing-injuries/at-home/older-](http://www.acc.co.nz/preventing-injuries/at-home/older-)

\(^{21}\) Directly based on evidence from RCTs and meta analysis of RCTs
\(^{22}\) Evidence from meta-analysis of RCTs or at least one RCT
The programme requires 6 home visits by the nurse or physiotherapist over a one year period, with telephone contacts in between. The patient also has to exercise for 30 minutes per day 3 times per week and go for a walk at least twice a week.

The programme manual is at


The activity booklet for use by participants is at


In the UK, the programme is already used by Lambeth and Southwark PCT and in a number of other areas. It also appears that training programmes in the delivery of OEP are available in the UK.

However, a note of caution is sounded by AGS / BGS (2011) in that exercise may increase falls in people with previously limited mobility who are not used to physical activity.

Exercise programmes should target strength, gait and balance, and good examples, for which there are good evidence are tai chi and physical therapy (AGS / BGS, 2011).

The National Exercise Referral Scheme (NERS) is also moving into providing falls prevention programmes. Processes and numbers of referrals are not yet clear, but this is discussed in more detail in section 7.4.1.
5.2.4 Exercise in extended care settings

**NICE (2004) Guideline**

“Multi-factorial interventions with an exercise component are recommended for older people in extended care settings who are at risk of falling”.

Recommendation grade A\(^{23}\), Evidence grade I\(^{24}\).

**Commentary**

This paper relates to community dwelling older people, not those in extended care settings.

AGS/BGS (2011) state that exercise programmes are supported only for community dwelling OAPs.

5.2.5 Home hazard and safety intervention

**NICE (2004) Guideline**

“Older people who have received treatment in hospital following a fall should be offered a home hazard assessment and safety intervention / modifications by a suitably trained health care professional. Normally this should be part of discharge planning and be carried out within a timescale agreed by the patient or carer, and appropriate members of the health care team.”

Recommendation grade A, level of evidence I

“Home hazard assessment is shown to be effective only in conjunction with follow-up and intervention, not in isolation”.

Recommendation grade A, level of evidence I

**Commentary**

This statement refers to older people treated as in-patients. This document relates mainly to community dwelling older people who are not being assessed or treated following in-patient treatment.

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\(^{23}\) Directly based on evidence from RCTs and meta analysis of RCTs

\(^{24}\) Evidence from meta-analysis of RCTs or at least one RCT
However, the ProFaNE position is that home hazard assessment should be carried out for those at high risk of falling, as well as those treated in hospital following a fall, that is, those with severe visual impairment, with difficulties with activities of daily living and following a fall obviously precipitated by the home environment.

Since the individual will need to be observed within their home environment and appropriate modifications and recommendations for behavioural change carried out, ProFaNE recommend that this is carried out by an Occupational Therapist. Therefore, an appropriate referral will need to be made and timely assessment carried out.

5.2.6 Psychotropic medications

**NICE (2004) Guideline**

“Older people on psychotropic medications should have their medication reviewed, with specialist input if appropriate, and discontinued if possible to reduce their risk of falling”.

Recommendation grade B\(^ {25}\), Evidence level II\(^ {26}\)

**Commentary**

The assessment process, as described by ProFaNE, identified individuals prescribed four or more medications or centrally acting medications. This, therefore, is a wider assessment than that suggested by NICE (2004). However, in the AGS/BGS (2011) guidance it is recommended that medication review or withdrawal is stressed for all older people, not just those taking more than four medications. This is based on fair evidence that the intervention could impact upon health outcomes.

The recommendations from ProFaNE for a medications review are based on a systematic review of medication as a risk factor for falls (Hartikainen et al, 2007) are as follows:

*Assess medication at regular intervals. Check indications for use of medicines and justify the prescription of every medication. Be aware that polypharmacy increases risks for interactions and adverse effects.*

*Consider carefully before prescribing any CNS drug to an older person.*

\(^{25}\) Directly based on evidence from at least one controlled trial without randomisation or at least one other type of quasi experimental study or extrapolated from RCT evidence.

\(^{26}\) Evidence from at least one controlled trial without randomisation or at least one other type of quasi experimental study.
Avoid the use of anxiolytics / hypnotics / sleeping pills. If they are felt to be required – they are only for short term use.

Check the diagnosis of depression before prescribing anti-depressants.

Antipsychotics should be used only for psychosis. In people with dementia and associated behavioural problems, use low doses of anti psychotics and only for psychotic period.

Avoid prescribing anticonvulsants for other indications than epilepsy.

For neuropathic pain you can use low doses of tricyclic antidepressants or some anticonvulsants whilst carefully observing potential adverse effects.

Check the indication before prescribing opioids.

When prescribing antihypertensives, antiarrythmics or alpha blockers remember to check orthostatic blood pressure at regular intervals.

It is recommended that this review is carried out by a GP or following referral to a specialist. With annual falls assessments, the protocol for carrying out the regular checks noted in point one is established.

If discontinuation of a high risk medication is not possible, dose reduction should be considered (AGS/BGS, 2011).

5.2.7 Fear of falling intervention

Intervention to address fear of falling is not included in the NICE guidance, but is an element of the ProFaNE assessment and intervention, if another risk factor is present.

A systematic review by Zijlstra et al (2007) examined interventions to reduce fear of falling in community living older people. Only randomised controlled trials were included in this review and fear of falling, in terms of fear, falls self-efficacy, concern about falling and balance self confidence, had to be an outcome measure. Trials also had to include only community living older people with a mean age of 65. Trials were assessed for methodological quality and those labelled as of higher quality are reported here. Unfortunately, the review gave no data on effect size, p values or confidence intervals.

In the trials of higher methodological quality, a community based group intervention of exercises, a home exercise programme and written falls avoidance information had no significant effect on fear of falling (Barnett
et al, 2003). Similarly, group exercise, medication management, vision assessment and home and community safety had no significant effect on falls efficacy (Clemson et al, 2004).

The Otago Exercise Programme did, however, have a significant impact on Falls Efficacy (Campbell et al, 1997; Robertson et al, 2001). Community based tai chi also had a significant effect on fear of falling (Li et al, 2005; Zhang et al, 2006).

A community cognitive behavioural intervention around adaptive beliefs about falls, strength exercises, falls risk and safety, safe behaviour and action planning also significantly affected falls efficacy in a compliant group (Tennstedt et al, 1998).

Individual multi-factorial intervention, based on similar assessments to those described here had a significant effect on falls efficacy (Tinetti et al, 1994). Individual home visits to address falls hazards (medical, environmental and behavioural) also had a significant effect on falls efficacy (van Haagstregt, 2000). Multi-factorial intervention by Yates and Dunnagan (2001; falls risk assessment, exercise, nutrition, environmental assessment) had a significant impact on falls efficacy.

Individual computerised balance training significantly reduced fear of falling (Wolf et al, 1996).

A hip protector intervention by Cameron et al (2000) had no significant impact on fear of falling.

5.2.8 Encouraging participation in falls prevention programmes and education and information giving

**NICE (2004) Guideline**

“To promote the participation of older people in falls programmes, the following should be considered:-

Health care professionals involved in the assessment and prevention of falls should discuss what changes a person is willing to make to prevent falls.

Information should be relevant and available in languages other than English.

Falls prevention programmes should also address potential barriers, such as low self-efficacy and fear of falling, and encourage activity change as negotiated with the participant.

Practitioners who are involved in developing falls prevention programmes should ensure that such programmes are flexible enough to
accommodate participants different needs and preferences and should promote the social value of such programmes.”

Recommendation grade D\textsuperscript{27}, Evidence level III-IV\textsuperscript{28}

“All health care professionals dealing with patients known to be at risk of falling should develop and maintain basic professional competence in falls assessment and prevention.

Individuals at risk of falling, and their carers, should be offered information, both orally and in writing, about:-

What measures they can take to prevent further falls
How to stay motivated if referred for falls prevention strategies that include exercise or strength and balancing components
The preventable nature of some falls
The physical and psychological benefits of modifying falls risk
Where they can seek further advice and assistance.
How to cope if they have a fall, including how to summon help and how to avoid a long lie.”

Recommendation grade D\textsuperscript{29}, Evidence level III-IV\textsuperscript{30}

\textbf{Commentary}

It is of little use to develop a falls programme that older people then fail to engage with. Definitive information on how to engage people is lacking, so the general advice given here should be followed.

It is possible that the proactive approach to fall prevention proposed here may encourage greater engagement. It is also possible that it may lead to less engagement because people do not feel that it is relevant to them.

AGS/BGS (2011) state that education is a primary and secondary prevention measure and is important for implementation and sustained use of falls prevention.

Involvement in the programme should be monitored and appropriate changes made if needed.

\textsuperscript{27} Directly based on evidence from expert committee reports or opinions and / or clinical experience of respected authorities or extrapolated from research evidence.
\textsuperscript{28} Evidence from non-experimental descriptive studies, such as comparative studies, correlation studies and case control studies. Evidence from expert committee reports or opinions and / or clinical experience of respected authorities
\textsuperscript{29} Directly based on evidence from expert committee reports or opinions and / or clinical experience of respected authorities or extrapolated from research evidence.
\textsuperscript{30} Evidence from non-experimental descriptive studies, such as comparative studies, correlation studies and case control studies. Evidence from expert committee reports or opinions and / or clinical experience of respected authorities
Developing basic professional competence in falls assessment is likely to have some value, but the complexity of the assessment and referrals process is likely to mean that greater value would be realised by having named specialists within a healthcare setting.

### 5.3 Brisk Walking

NICE (2004) stated that there is no evidence that brisk walking reduces the risk of falling. However, it was also stated that brisk walking may have other health benefits.

Walking is part of the Otago Exercise Programme and this programme has demonstrated evidence of effectiveness. Therefore, walking is recommended as part of a wider exercise programme.

### 5.4 Insufficient evidence

NICE (2004) produced a list of items for which there is insufficient or conflicting evidence around:

- Low intensity exercise combined with incontinence programmes
- Untargeted group exercise
- Cognitive / behavioural interventions
- Hip protectors

#### 5.4.1 Referral for correction of visual impairment

To carry out a full review of the evidence to determine whether or not it is necessary to update the position taken by NICE is beyond the scope of this paper. However, information is readily available on visual impairment correction.

Within the assessment process, identified visual impairment is followed by either referral for occupational therapy assessment (Campbell et al, 2005) or to have cataract surgery expedited (Harwood et al, 2005). Both papers provided as evidence were published after the NICE (2004) guidance.

The occupational therapy assessment falls outside of the NICE statement.
The paper by Harwood et al (2005) describes a study that specifically aimed to determine whether falls risk could be reduced by corrective surgery for vision problems. The randomised controlled trial clearly described the allocation process, but once allocated, it was impossible to ‘blind’ cases or assessors to allocation. With 1600 eligible cases and only 482 invited to participate, there may be some concerns about the generaliseability of the findings.

With 49% of cases in the expedited group falling and 45% in the routine group, the hazard ratio for any fall was 0.95 (95%CI 0.69 to 1.35), a non significant effect. For a second fall, risk dropped significantly in the intervention group, by 40% (Hazard ratio 0.60, 95%CI 0.36 to 0.98, p =.04). However, when compared in terms of fall rates, the expedited group had a fall rate of 1.00 per 1000 patient days, with the routine group a fall rate of 1.52, giving a rate ratio of 0.66 (95%CI 0.45 to 0.96, p=.03).

Therefore, the falls rate in the expedited group was significantly reduced, as were the numbers of second falls. However, there was no significant effect on falls overall. The authors concluded that guidance to expedite cataract surgery was appropriate. The guidance quoted was that of the British Geriatric Society (BGS), American Geriatric Society and American Association for Orthopaedic Surgery (AGS/BGS, 2011).

The BGS, in recommendations updated in 2010, recommend inclusion of an expedited cataracts intervention in their falls clinical guidance.

5.4.2 Vitamin D

Vitamin D is recommended by AGS/BGS (2011) as a daily supplement for all older adults at risk of falls. However, the detail of their recommendation does not include evidence to support vitamin D outside of long term care. The guidance therefore regards there to be insufficient evidence for Vitamin D in community dwelling older people.
5.5 Evidence for multi-factorial interventions

Multi-factorial interventions are likely to be costly and time consuming to set up and effectiveness of individual programmes difficult to prove. However, evidence does suggest that they are likely to be most effective in those at high risk of falling (Costello and Edelstein, 2008) and with individual risk factor management the most suitable approach (Campbell and Robertson, 2007).

A wide variety of meta-analyses have been carried out using different criteria to test the effectiveness of multi-factorial interventions.

A meta analysis by Chang et al (2004) combining data from 10 studies of multi-factorial falls risk assessment and management that reported on participants falling at least once found an 18% reduction in falls risk (Adjusted risk ratio 0.82, 95%CI 0.72 to 0.94). Further analysis of 7 studies found a 27% reduction in fall rate (adjusted incidence rate ratio 0.63, 95%CI 0.49 to 0.83). The number and nature of risk factors assessed in these programmes varied, but included medication review, balance and gait assessment and environmental hazard assessment. Further analysis was carried out to determine whether these findings were due to preferential enrolment of certain risk groups in the study. However, no significant differences were found.

The findings of Gillespie et al (2010) were more positive with a pooled effect of 0.75 (95%CI 0.65 to 0.86) reported, but with substantial heterogeneity between studies. Removing outliers, thus reducing heterogeneity reduced the effect to 0.82 (95%CI 0.76 to 0.90); still significant and in line with Chang et al (2004).

Overall, this review concluded that multi-factorial interventions integrating assessment with individualised intervention are effective in reducing rate of falls but not risk of falling.

In another meta-analysis, multi-factorial intervention was found to reduce the proportion of fallers by 27% (OR 0.73, 95%CI 0.63 to 0.85; pooled data from Fabacher et al, 1994; Jitapunkul, 1998; Newbury et al, 2001; Wagner et al, 1994), in un-selected community dwellers. It also reduced fallers by 31% (OR 0.69, 95%CI 0.52 to 0.90; Tinetti et al, 1994) in a community dwelling targeted population, while a pooled analysis of a similar population found that fallers were reduced by 14% (OR 0.86, 95%CI 0.76 to 0.98; pooled data from Close et al, 1999; Hogan et al, 2001; Kingston et al, 2001; Lightbody et al, 2002; van Haagstregt et al, 2000), in a community dwelling targeted population.

However, non significant effects have also been reported, in particular in an approach using a medical screen, home hazard assessment and
exercise programme in un-selected community dwellers (Steinberg et al, 2000; Van Rossum et al, 1993) and also following screening and intervention in a chronic care clinic (Coleman et al, 1999).

The ProFaNE guidance and NICE (2004) both recommend individually tailored programmes based on risk factor assessments. What tends to happen in intervention programmes for which the evidence is presented is that the elements of the intervention are pre-determined by the research teams. The success of interventions will then be influenced by the extent to which the risk factors are present in the study population. Testing the effectiveness of a truly individualised programme in a experimental study is likely to be very difficult.

5.5.1 Delivery of multi-factorial interventions

The review by Wood et al (2009) also highlighted a study by Spice et al (2009) carried out in Winchester, UK. The project compared falls prevention provided in secondary care with that provided in primary care and usual care. The main quoted findings were of a significant reduction in falls in the secondary care group (v usual care adjusted OR 0.52, 95%CI 0.35 to 0.79, p=0.002) and no significant change in the primary care group (v usual care adjusted OR 1.17, 95%CI 0.57 to 2.37, p=0.673). However, the poor quality of this trial and the fact that the primary care arm, in particular, was underpowered, means that these findings must be taken very lightly.

To summarise some of the problems; the study was carried out in general practice, but the number of eligible older people was never stated, nor were the selection criteria. There is no concealment of allocation. The process of random allocation was at the practice level and was a simple process; whilst this should not be a problem, there were some differences in the three groups at baseline. In particular, the primary care group were less likely to be independent, therefore presenting a very different risk of falling, ability to participate in an intervention and likelihood of an interventions success. Further issues with this process are discussed later.

Perhaps the biggest issues were around sample size and the assumptions made in the calculation. The calculation was based on 52% of controls falling and a 20% reduction in falls, giving 150 participants per arm, increased to 172 to account for clustering associated with the GP level randomisation. The results of the study demonstrated that 84% of controls fell, compared with 87% of the primary care arm and 75% of secondary care. Therefore more fell, reducing the number needed, but the effect was less than half of that predicted, greatly increasing the sample size needed. Furthermore, with there being only 159 participants in the usual care arm, 136 in the primary care group and 210 in the secondary care group, only the secondary care arm contained enough subjects to be appropriately powered. Why there were such large differences in the
numbers in each group is not clear and there were stated to be demographic differences between the practices. These are likely to have created biases that affect the results. They also make the study underpowered to detect important differences, with the primary care arm likely to be particularly badly affected.

These issues are further compounded by 8 practices being involved in the primary care group, compared with just 4 in the secondary care arm and 6 in the usual care arm. If the randomisation had been carried out as stated, with 18 practices allocated in blocks of 3, there should surely have been 6 practices in each arm of the study?

There is no detailed discussion of the limitations of this study, just a discussion of how the findings relate to other similar studies. This again tends to emphasise the finding around falls in the secondary care group without critically examining it. What is also noted, but lacks emphasis is the lack of significant difference between the primary care and secondary care group and that in arguably the more important measures of fracture (primary care OR 0.85, 95%CI 0.53 to 1.37; secondary care OR 0.90, 95%CI 0.61 to 1.34) and fall related hospital admission (primary care OR 0.55, 95%CI 0.29 to 1.03; secondary care OR 1.17, 95%CI 0.84 to 1.61) the outcomes were either very similar or favoured the primary care arm.

Ultimately, however, the manner in which the study was conducted means that the results offer little to the debate.

5.6 Population based multi-strategy interventions

Interventions described in the previous section are individually based and result from individual assessment.

The information available suggests that there is good evidence that these interventions are effective in reducing falls.

Multi-strategy interventions differ from the multi-factorial interventions in that a set package is delivered across the entire population, rather than being tailored for individual risks and needs.
5.6.1 Preventing fall related injury; McClure et al, 2008

There is evidence to indicate that population based interventions to reduce fall related injuries are effective (McClure et al., 2008). This Cochrane review sought studies that reported changes in medically treated fall related injuries in older people following the implementation of a controlled population based intervention.

The heterogeneity of the included studies meant that meta-analysis was not possible, but of the 35 identified studies, six met the inclusion criteria and all reported decreases in fall related injuries ranging from 6% to 33% (McClure et al., 2008).

The six included studies and the characteristics of the interventions were as follows:-

Kempton (2000), Australia, Stay on your Feet, 60+ year old community dwellers
- Small media brochures, posters and milk cartons
- Information through television and radio
- Community education
- Home hazard reduction
- Policy development
- Engagement of local clinicians

Lin (2006), Taiwan, 65+ year old rural community residents
- Tai chi exercises
- Education on falls prevention

Lindqvist (2001), Sweden, Motala Safe Community, 65+ year old community residents
- WHO Safe Community
- Injury Prevention Information in the Media
- Safety education through community displays and media
- Home visits
- Environmental modifications: road and walkway improvements, lighting in public places

Poulstrup (2000), Denmark, 65+ year old community residents
- Educational talks in local clubs and centres
- Mailed leaflets on falls risk factors
- Promotion of physical activity and diet
- Reduction in home hazards
- Nurse and GP home visits

Svanstrom (1996), Sweden, Lidkoping Accident Prevention Programme, 65+ year old community residents
- WHO Safe Community
• Community Safety Displays
• Training of area health care workers

Ytterstad (1996), Norway, Harstad Injury Prevention Study, 65+ year old community residents
• WHO Safe Community
• Local media coverage of programme
• Educational talks to elderly
• Home visits by health professionals to high risk individuals
• Promotion of safe footwear and physical activity
• Promotion of home hazard removal
• Engagement with local community agencies and services

Overall, the authors concluded that despite methodological limitations, the consistency of the findings support the notion that population approaches to preventing fall related injuries are effective and can support public health practice. What is now needed are community randomised controlled trials of these interventions and information on barriers and facilitators that influence programme effectiveness.

The results of this review were generally positive, however, the results are influenced by the population targeted and the components used (Wood et al, 2009). Generalising these results to a specific population is likely to be difficult. In addition, we have no clear idea of which elements are most important or effective or whether the elements are all equally important.

5.6.2 Preventing falls in older people living in the community; Gillespie et al, 2010

As part of their review, Gillespie et al (2010) looked to pool data on multi-strategy interventions. All of the trials analysed used exercise in combination with one or more other interventions.

Six of the included studies contained data on rate of falls, but only two had a significant effect; Clemson et al (2004) used exercise, education and a home safety intervention to produce a 31% reduction in falls rate (rate ratio 0.69, 95%CI 0.50 to 0.96), while Swanenberg et al (2007) found that exercise and vitamin D supplements also reduced falls (rate ratio 0.19, 95%CI 0.05 to 0.68) but studied just 20 people.

The review reached no specific conclusions about this type of approach.

As with the comments on McClure et al (2008) identifying the most effective elements of a multi-strategy approach is not possible.
5.7 Single factor interventions


Individual and group exercise programmes were found to reduce incidence of falls by up to 17% (Chang et al, 2004; Costello and Edelstein, 2008; Baker et al, 2007; Sherrington et al, 2008). Tai Chi was also found to reduce falls rates (Gillespie et al, 2010), but needs instructors to be trained in delivery of the intervention.

In their systematic review, Gillespie et al (2010) found that exercise classes containing multiple components were found to significantly reduce falls (pooled rate ratio 0.78, 95%CI 0.71 to 0.86) and fall risk (pooled rate ratio 0.83, 95%CI 0.72 to 0.97). Home based exercise with multiple components was also found to significantly reduce falls (pooled rate ratio 0.66, 95%CI 0.53 to 0.82) and falls risk (pooled rate ratio 0.77, 95%CI 0.61 to 0.97; Gillespie et al, 2010). The pooled rate ratio for effect of Tai Chi on falls was 0.63 (95%CI 0.52 to 0.78; risk of falling 0.65, 95%CI 0.51 to 0.82; Gillespie et al, 2010). Gait and balance training also reduced falls (pooled rate ratio 0.73, 95%CI 0.54 to 0.98; Gillespie et al, 2010). The rate ratio for falls risk failed to reach significance, but given the borderline confidence intervals it seems unwise to use this as a reason not to recommend such an approach (pooled rate ratio 0.77, 95%CI 0.58 to 1.03). There was no significant effect of other exercise interventions (Gillespie et al, 2010). Gillespie et al (2010) concluded that exercise is an effective intervention to reduce the risk a rate of falls.

Education interventions, such as pamphlets, posters or one-to-one counselling, have no clear evidence of effectiveness (Gillespie et al, 2010; Peel and Warburton, 1999).

Home safety interventions alone lack evidence of effectiveness in reducing injuries (Lyons et al, 2010). The pooled effect on falls determined by Gillespie et al (2010) was of 0.90 (95%CI 0.79 to 1.03). However, falls have been reduced following home safety intervention in people with visual impairments (rate ratio 0.59, 95%CI 0.42 to 0.82). Gillespie et al (2010) agreed with Lyons et al (2010) that home safety interventions do not appear to reduce rate of falls or risk of falling, but that people at higher risk or with specific risk factors may benefit from such an intervention.

Medication review alone was examined in a study of psychotropic drugs in New Zealand. Gradual drug withdrawal was found to significantly reduce...
falls risk at 44 weeks follow up, but at the end of the intervention, many returned to use of the medication (Campbell et al, 1999).

Vision assessment and correction is under researched, but one study has suggested that falls may actually have increased following correction as a result of behaviour change (rate ratio 1.57, 95%CI 1.19 to 2.06). This may be due to increased activity levels amongst people who have received treatment. What may be needed is accompanying assessment of quality of life. However, cataract surgery has been found to reduce falls by 34% (rate ratio 0.66, 95%CI 0.45 to 0.95; Gillespie et al, 2010).

5.8 Single v multi strategy community interventions

There has been debate around the relative merits of single v multi-strategy community interventions. Logically, multi-strategy approaches are more costly and the issue is whether they provide additional benefit for the money spent.

Comparison of the approaches found that fall reduction was similar in both single and multi-strategy community interventions at around 22% for multi and 23% for single approaches (Campbell and Robertson, 2007).

Why there is so little variation between the two approaches, given the additional elements of the multi-strategy approach, is not clear. It is possible that the multiple elements may interact to reduce effectiveness or people may only engage with one part of the intervention (Campbell and Robertson, 2007).

At a community level, therefore, it has been concluded that targeted single interventions are most acceptable and easily implemented (Campbell and Robertson, 2007).

5.9 Cost effectiveness

Demonstrating that falls prevention is cost effective is difficult, and not just in the UK. This is, in part, due to difficulties with linking the intervention closely to outcomes and to the value of preventing outcomes other than fractures being difficult to assess.

Another issue may be that there is a lack of awareness and acceptance of the fact that money does need to be invested in falls prevention services if they are to be run effectively and realise benefits in terms of prevention of falls. In addition, it seems unlikely that falls prevention services could ever have an immediate impact; investment now is likely to lead to benefit at an unknown time in the future.
A lack of effectiveness of falls prevention to date may be linked to a reluctance to spend an appropriate proportion of the overall costs of falls on their prevention. What is an appropriate proportion? That is not clear, but it is not unreasonable to suggest that efforts to date have been to spend as little as possible and then to wonder why there is little effect.

5.9.1 Individual based multi factorial falls interventions

The trial by Irvine et al (2010) and Conroy et al (2010), in Nottingham, UK, used a modified version of FRAT (Falls Risk Assessment Tool) as a screening tool. This assessed falls history, previous stroke, Parkinson’s disease, problems standing up, dizziness, problems walking and being housebound (Conroy et al, 2010). So, compared with the ProFaNE tool and the NICE guidance, the screening tool is far more detailed, however in assessment terms it covers fewer of the known risk factors. The assessment was carried out by, or under the direction of a consultant geriatrician. This will therefore affect the cost effectiveness of a programme, especially if compared with the notion that any health professional could carry out a basic level assessment.

The trial found that of 2846 over 70 year olds who responded to an invitation to participate in a falls trial (n=5289 invited, n=6133 over 70 year olds registered with 8 participating general practices), 1481 were at high risk of falling (Conroy et al, 2010). However, of these, only 364 agreed to participate in the trial, with 181 randomised to control, 183 to intervention (Conroy et al, 2010).

These data alone are important to any screening programme; half of respondents to the invitation to participate were found to be at high risk and therefore to require further intervention. But, what ‘high risk’ is is not clear. Is it 1, 2 or all 5 FRAT elements? There then must be questions as to whether this is an appropriate level of sensitivity and specificity for screening. These data therefore provide guidance as to the potential ‘burden’ of a screening programme. However, they also indicate uptake may potentially be low. To be effective, uptake would need to be increased.

At baseline, the intervention group was found to have a wider age range (70 to 101 v 70 to 92 in the control group). They also had more falls risk factors (Conroy et al, 2010), possibly due to the wider age range. There were more females in the control group, but not significantly so (62% control v 58% intervention; 95%CI for difference in proportions -6.1% to 13.9%, not given in paper). Although greater proportions of the intervention group exhibited falls risk factors, calculation of the differences for this paper, but not given by the authors showed that they were not significant.
Of the 183 intervention group participants, 72% participated in the falls prevention programme (Conroy et al, 2010).

The intervention arm participants self reported 260 falls (1.7 falls per person year), compared with 417 in the control arm (2.7 falls per person year) (Conroy et al, 2010). It is possible that this difference is due to under-reporting in the intervention group; with blinding impossible, there is likely to be some element of response bias in the intervention group. However, one participant in the control arm reported 107 falls in the one year period (Conroy et al, 201). Including this participant the adjusted incidence rate ratio was 0.64 (95%CI 0.43 to 0.95, p=0.03), excluding gave an incidence rate ratio of 0.86 (95%CI 0.73 to 1.03, p=0.07) (Conroy et al, 2010). To be realistic, even though not significant, the incidence rate ratio when excluding the outlier indicates that substantial benefit is possible with little harm.

The study used self reported falls as a primary outcome, but it was also reported that 7 intervention and 6 control arm participants were admitted to hospital following falls (Conroy et al, 2010). These numbers are too small for further analysis, as were the numbers institutionalised. These data also serve to emphasise why an outcome such as hip fracture is so difficult to measure.

For the 12 month study and follow up period, screening costs were estimated as £165 per participant recruited, with average falls prevention programme costs of £349 per participant (Irvine et al, 2010). The falls prevention programme was found to be more costly (mean incremental cost £578 (95%CI -£8188 to £13,212)) and more effective (mean incremental effect = 0.17 falls averted per person year (95%CI -8.0 to 8.0)) (Irvine et al, 2010). The incremental cost per fall averted was £3320 (Irvine et al, 2010).

The paper provided no strong conclusions of cost effectiveness, but as with a study in the Netherlands (Hendricks et al, 2008), found the intervention to be more expensive, but with additional health benefits, neither of which were statistically significant (Irvine et al, 2010).

The authors concluded that cost effectiveness of this approach had not been demonstrated, and included in their limitations that people may be more reluctant to participate than they would in a routine service (Irvine et al, 2010).

While more research may be valuable, it does not consider the fact that there are already many falls clinics of some sort running in many parts of the UK. This makes identifying a ‘clean’ population very difficult, this also means that it would be difficult to extend this study to a larger population. The follow up of one year was also relatively short, therefore the
intervention was too. The costs of the intervention will be reduced over time, while the benefits may accumulate.

Finally, we have to question whether it would be possible to ever accurately and satisfactorily determine the true cost effectiveness of a falls prevention programme based on the complexity of assessment and intervention and the variety of possible outcomes.

If we conclude that it seems unlikely that cost effectiveness could ever truly be determined then further delays to screening programmes recommended under expert guidance are unethical.

If we conclude that cost effectiveness should be possible to assess, then criteria for what would be required and in what setting should be considered, along with an appropriate time frame for developing these data.

The trial by Conroy et al (2010) began in 2005 and follow up was completed in 2008. The paper was received by Age and Ageing for review in December 2009. Supposing that the development period for the study is estimated at around two years and that results were available one year before submission, the study still took 5 years from development to data availability. This ignores the possibility that research funding was sought for the study, a process that probably took a further two years.

The question then becomes; if we were to begin to plan a cost effectiveness study now, is it acceptable to wait 7 years before possibly beginning to implement a falls screening programme that experts are recommending now? Given the time needed to implement such a programme, we would be potentially looking at 10 years before substantial action.

The review by Gillespie et al (2010) also looked at cost effectiveness data where it was available. Three studies were shown to have potential cost savings associated with delivering the intervention. Cumming et al (1999) carried out a home safety assessment and modification in those recently hospitalised following a fall. The incremental cost effectiveness ratio demonstrated that this intervention was associated with cost savings. A review of the Otago Exercise Programme (Robertson, 2001) demonstrated savings in terms of hospital admissions. Finally, the multi-factorial programme implemented by Tinetti et al (1994) was found to elicit savings in terms falls prevented and falls requiring medical treatment prevented in a group with more than four risk factors, but not for those with less than four risk factors.

A cost utility analysis associated with expedited cataract surgery was also identified (Harwood et al, 2005). Based on the 12 month trial period only, the cost per QALY was £35,704, therefore exceeding current UK
thresholds. However, modelling across the expected lifespan reduced the cost per QALY to just £13,172.

5.9.2 Population based interventions

‘Stay on your Feet’ was estimated to have direct costs of A$781,829 and benefits ranging from A$5.4M to A$16.9M. The net monetary benefit to cost ratio was 20.6 to 1 (Beard et al, 2006; Davis et al, 2009). These estimates were also believed to underestimate the true benefits of the intervention which were felt to last beyond the life of the programme (Beard et al, 2006).

5.9.3 Single risk factor interventions

A review by Davis et al (2009), looking at the cost effectiveness of different falls interventions found that, in cost effectiveness terms, the most favourable intervention was the Otago Exercise Programme (OEP), costing £173 per fall prevented. Home safety interventions were found to cost from £304 per fall prevented, with cataract surgery costing £4372 per fall averted. While these elements may be included in multi-factorial interventions, trying to combine them to give an overall assessment of cost effectiveness of a multi-factorial intervention is impractical. In addition, this review converted results of international studies to GB pounds. The true applicability and generaliseability of these findings is unknown. However, the authors did conclude that single interventions targeted at high risk groups can prevent the greatest number of falls and the lowest incremental costs.

A study by Day et al (2010) in Australia examined population wide Tai Chi and found that the equivalent of Euro16.4M, or 4.2% of the total cost of hospital in-patient care would need to be invested in tai chi, and have high uptake, to have a large effect on falls and fall related hospitalisations.
6 Estimate of burden of screening / risk assessment

If the process described in section 5.1, that is the screening / risk assessment process, is to be implemented, it is important to have better understanding of the numbers of people who are likely to move through each stage of the process. So, data would be needed on size of the population to be screened, expected numbers found to have fallen or be at risk of falling, expected numbers having 1 or 2 risk factors, and so on.

Obtaining these data is not easy because of the vast number of screening and assessment tools in use in different populations.

It has been suggested that one checklist in use with over 75 year olds in Cardiff identified 1 in 6 people as being at risk of falling and requiring assessment (Pooviah et al, 2003). However, with just 114 people involved in the study and with assessments carried out by 10 different observers, the validity of these findings is questioned. Furthermore, the ‘screen’ covered 13 falls risk factors, making it more akin to a full assessment. The screen appeared to have been carried out using a BGS tool, but exactly what it was is not clear. It appeared that 20 people were at risk of falling and 10 had presented with a fall or fracture in the previous year, however, the data were not clear.
7 Current falls prevention initiatives in Wales

7.1 UK action

7.1.1 National Hip Fracture Audit

The National Hip Fracture Database was set up in 2007 by the British Orthopaedic Association and British Geriatrics Society to improve care of hip fracture patients and prevent further hip fracture for these patients.

Six auditable standards have been set out, these are; prompt admission to orthopaedic care, surgery within 48 hours, nursing to minimise pressure ulcer development, routine access to ortho geriatrics, bone health promotion and falls assessment.

The 2010 audit report\(^{31}\) estimated that the 8 contributing hospitals in Wales treated around 2000 hip fractures in 2010 (NHFD, 2010).

Compliance with the auditable standards was variable across the reporting sites, but variation in falls assessments was probably the most considerable, ranging from 0.3% at UHW to 93.1% at Ysbyty Gwynedd (table 22).

Accessed 29 April 2011
### Table 22: Findings of 2010 Hip Fracture Audit

<table>
<thead>
<tr>
<th>Hospital</th>
<th>estimated hip #</th>
<th>n submitted</th>
<th>% submitted</th>
<th>% surgery in 36hrs</th>
<th>% surgery in 48hrs</th>
<th>% treated without surgery</th>
<th>% arthroplasties cemented</th>
<th>% patients developing pressure ulcers</th>
<th>% pre op ass’t by geriatrician</th>
<th>% bone health meds at admission</th>
<th>% bone health medication ass’t</th>
<th>% falls ass’t</th>
<th>Avg LOS acute</th>
<th>Avg LOS trust</th>
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<tr>
<td>Bronglais Hospital, Ysbyty Gwynedd</td>
<td>90</td>
<td>83</td>
<td>92.2%</td>
<td>47.4</td>
<td>68.4</td>
<td>6.0</td>
<td>100</td>
<td>17.6</td>
<td>0.0</td>
<td>7.2</td>
<td>95.3</td>
<td>15.1</td>
<td>21.0</td>
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<td>Ysbyty Gwynedd</td>
<td>280</td>
<td>103</td>
<td>36.8%</td>
<td>64.9</td>
<td>95.3</td>
<td>1.9</td>
<td>61</td>
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<td>Wrexham Maelor Hospital</td>
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<td>232</td>
<td>92.8%</td>
<td>63.9</td>
<td>86.6</td>
<td>9.9</td>
<td>36</td>
<td>3.5</td>
<td>23.9</td>
<td>11.6</td>
<td>41.6</td>
<td>78.3</td>
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<td>246</td>
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<td>70.9</td>
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<td>54</td>
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<td>University Hospital of Wales</td>
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<td>86</td>
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<td>60.5</td>
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<td>West Wales General</td>
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<td>235</td>
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<td>86.0</td>
<td>0.9</td>
<td>56</td>
<td>0.5</td>
<td>0.5</td>
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<td>97.6</td>
<td>5.1</td>
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<tr>
<td>Withybush Hospital</td>
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<td>82.7%</td>
<td>48</td>
<td>72.5</td>
<td>1.8</td>
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7.1.2 National Audit of the Organisation of Services for Falls and Bone Health of Older People

Carried out by the Clinical Effectiveness and Evaluation Unit of the Royal College of Physicians, on behalf of the Healthcare Quality Improvement Partnership, the most recent falls and bone health services audit was in 2009.32

The key findings of this audit were that opportunities to prevent recurrent falls and fractures are being missed, that co-ordinated falls and fracture strategies are rare, with public health data on fracture rates inadequate or unavailable. In addition, guidance on treatments to prevent falls and fractures is not adhered to, with prevention not provided to patients who have suffered a first fracture and a failure to provide evidence based exercise programmes.

The audit also highlighted that fracture liaison services have yet to be universally commissioned or provided.

Since the audit was carried out before the most recent NHS re-organisation in Wales, the data relate to NHS Trusts and Local Health Boards (table 23).

### Table 23: Findings of 2009 National Audit of Services for Falls and Bone Health

<p>| Written local commissioning strategy for bone health | Local population based report on falls and bone health services including hip fracture rates | POCO level mechanism to assess whether primary care treatment for fragility is provided in accordance with TAG 87 | First level screening tool in use, including falls screening within a defined time period | Does screening tool trigger an assessment as per locally agreed falls pathway | Written, agreed intervention provided to patients | Fracture liaison nurse or similar | Validation of home hazard assessment? | Written, agreed exercise programme? FAME / OTAGO | Pathway to access syncope services? | In-patient falls prevention policy | In-patient falls rate calculated | Access to walking aids within 24hrs | Patients attending A&amp;E or MAU screened? | Routine pre op assessment | Patients views on service |
|------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|------------------------------------------------------------------------|---------------------------------------------------------------------------|---------------------------------------------------------------------------------|--------------------------------------------------------------------------|---------------------------------------------------------------|--------------------------------------------------------------------------------|---------------------------------------------------------------|--------------------------------------------------------------------|
| Neath Port Talbot Hospital                           | Yes                                 | Yes                                                                                           | No                                                               | No, partly                                                                                                                  | No                                                                                             | No                                                                                     | Yes                                                                 | Yes, fully                                                                  | No, not at all                                                              | No                                                                                   | No                                                                | No                                                                 | Yes                                                                 | Yes                                                                 | Yes                                                                 |
| Swansea LHB                                          | No                                  | No                                                                                           | No                                                               | Yes, partly                                                                                                                | No                                                                                             | No                                                                                     | No                                                                 | No                                                                                                                                     | No                                                                                             | No                                                                                   | No                                                                | No                                                                 | Yes                                                                 | Yes                                                                 | Yes                                                                 |
| Neath Port Talbot Hospital                           | Yes                                 | No                                                                                           | Yes                                                              | No, fully                                                                                                                  | No                                                                                             | No                                                                                     | Yes                                                                 | Yes, fully                                                                  | No, not at all                                                              | No                                                                                   | No                                                                | No                                                                 | Yes                                                                 | Yes                                                                 | Yes                                                                 |
| Newport LHB                                          | Yes                                  | No                                                                                           | Yes                                                              | No, fully                                                                                                                  | No                                                                                             | No                                                                                     | Yes                                                                 | Yes, fully                                                                  | No, not at all                                                              | No                                                                                   | No                                                                | No                                                                 | Yes                                                                 | Yes                                                                 | Yes                                                                 |
| Monmouthshire LHB                                    | No                                   | No                                                                                           | No                                                               | Yes, partly                                                                                                                | No                                                                                             | No                                                                                     | Yes                                                                 | Yes, fully                                                                  | No, not at all                                                              | No                                                                                   | No                                                                | No                                                                 | Yes                                                                 | Yes                                                                 | Yes                                                                 |
| Torfaen LHB                                          | Yes                                   | Yes                                                                                           | No                                                               | Yes, partly                                                                                                                | No                                                                                             | No                                                                                     | Yes                                                                 | Yes, fully                                                                  | No, not at all                                                              | No                                                                                   | No                                                                | No                                                                 | Yes                                                                 | Yes                                                                 | Yes                                                                 |
| Cardiff and Vale                                     | No                                   | No                                                                                           | No                                                               | No, not                                                                                                                   | No                                                                                             | No                                                                                     | Yes                                                                 | Yes, fully                                                                  | No, not at all                                                              | No                                                                                   | No                                                                | No                                                                 | Yes                                                                 | Yes                                                                 | Yes                                                                 |</p>
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<th>Gwynedd LHB</th>
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<th>Prince Philip</th>
<th>West Wales General</th>
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**Date:** 26 April 2011  **Version:** 0d  **Page:** 92 of 124
7.2 **National action**

7.2.1 **National Service Framework for Older People in Wales**

The 2006 National Service Framework (NSF) for Older People in Wales included a standard on falls and fractures (NSF, 2006).

This standard stated that the NHS, working in partnership with Local Authorities and other stakeholders, takes action to prevent falls, osteoporosis, fractures and other resulting injuries, and to maintain well being in their populations of older people. Older people who have fallen receive effective treatment and rehabilitation and, with their carers, receive advice on prevention through integration of falls and fracture services (NSF, 2006).

A Health Gain Target of a 10% reduction in hip fractures in the over 75s by 2012 was also set.

A call was made for falls services to be established within specialist multi-disciplinary and multi-agency services for older people, to work with older people at high risk of falling.

Public Health action was called for mainly in terms of activities to minimise osteoporosis, that is, weight bearing activity, healthy eating and reduction in smoking. Also suggested was regular sight checks, ensuring pavements are clear and in good repair and making property safer. Much of the emphasis is on making improvements to the home environment to improve safety and reduce risk.

The NSF also reiterates the NICE (2004) guidance that older people should routinely be asked whether they have fallen in the last year and recommends multi-factorial falls assessment for fallers or people with gait or balance problems.

7.2.2 **NLIAH 1000 lives+ Reducing Harm from falls**

The 1000 lives+ programme was established in 2010 to reduce the mortality and harm from falls that occur in the community (NLIAH, 2010).

The initiative is targeted at those who have already suffered an injurious fall and are in contact with health or social care services as a result. It uses a care bundles approach to treat people who have fallen from a standing height and seek treatment as a result. It includes people living in the community and in nursing and residential homes, but not people who fall from a height, as a result of sport or leisure, who fall in hospital or who have suffered a medical emergency.
The definition of a fall used by the NLIAH programme is different from that used by NICE (2004), which is, in turn, based on AGS / BGS guidance that a fall is “an event whereby an individual comes to rest on the ground or another lower level with or without loss of consciousness” (AGS / BGS, 2001).

The programme is based on a trigger; a fall that is reported, most likely to a health care professional, an assessment; a basic multi factorial risk assessment, and appropriate intervention.

The outcomes to be monitored are number of calls for 999 ambulances as a result of falls from standing height and numbers of hip fractures.

7.2.3 Primary Care Quality Improvement Toolkit – Secondary prevention of falls for older adults

This was produced for use by general practices to ensure that the delivery of services to older adults (65+ years) who fall is evidence based and in line with best practice.

The definition of fall used is that used by NICE (2004).

The document also reiterates the NICE guidance that older people should routinely be asked if they have fallen in the past year, but states that both osteoporosis and falls assessment should then be carried out in those found to be at risk.

A guide to the possible components of an assessment is then provided, as is guidance on clinical reflection.

Methods for the audit process and inclusion criteria are also given.

7.3 Health Board action

7.3.1 Abertawe Bro Morgannwg

Awaiting information

7.3.2 Aneurin Bevan

Based on submissions to WAG in relation to monitoring compliance with the NSF (2006; see section 7.2.1), there is work on-going in Aneurin Bevan to support falls prevention.

In Blaenau Gwent, a Community Reablement team operates until 8pm, but it is not clear whether this is everyday or just weekdays only. The falls assessment and intervention service includes a physiotherapist, occupational therapist, nurse and support workers, with assessments
provided at home or in an appropriate community setting on a same day basis for urgent cases.

7.3.3 Betsi Cadwaladr
Awaiting information

7.3.4 Cardiff and Vale
In the Vale of Glamorgan, fallers who call 999 following a fall, but have either no physical injury or refuse to attend the ED are passed to the Clinical Referral Centre (CRC). The patient is then followed up with falls assessment and appropriate intervention.

7.3.5 Cwm Taf
Awaiting information

7.3.6 Hywel Dda
Camu Mlaen liases with A&E departments to identify fallers over the age of 75 years who return home following A&E treatment or following discharge from hospital. These people are then invited to have a falls assessment in their own home.

7.3.7 Powys
Awaiting information

7.4 National action outside the NHS

7.4.1 National Exercise Referral Scheme (NERS)
Awaiting information

7.4.2 Care and Repair (Cymru)
Awaiting information

7.4.3 Older People’s Commissioner for Wales
Awaiting information
7.4.4 Age UK

Awaiting information
8 Next steps

The information presented in this document is not new. The aim was to consolidate different types of information from a variety of sources to develop a better understanding of how efforts to reduce the future burden of falls should progress.

A number of falls programmes are already likely to be in place across Wales, but where these are, who they serve, how they are accessed and the guidance followed in delivering such programmes is not clear. Nor is the evidence for their effectiveness. It has been clearly stated in this document that the evidence of effectiveness of falls prevention programmes is likely to be difficult to generate and getting ‘bogged down’ in seeking evidence of effectiveness is unlikely to be helpful. However, it is unreasonable to expect to continue to deliver falls prevention services that have no effect on falls.

An associated issue is that it is also unreasonable to continue deliver ‘falls prevention’ that depends on an individual having already suffered a medically treated fall.

It is therefore important to ensure that existing services conform to current guidance and that they are proactive, rather than reactive in their falls prevention efforts.

As well as reviewing current services, identifying gaps and developing new services should also be important.

Public Health in Wales has, to date, not been heavily involved in neither the development nor delivery of falls prevention services. A number of potential roles now become apparent:-

1) Supporting Health Boards in identifying and evaluating current services

2) Supporting Health Boards in delivering new services. These may take the form of:-

   a) Implementing a falls ‘screening’, assessment and intervention programme aimed at individuals. This programme may be delivered in primary or secondary care and may be managed by current primary or secondary care practitioners or in a similar manner to other screening services in Wales with dedicated, specialist staff.

   b) Implementing population based interventions to reduce falls risk.

3) Development of health board level epidemiology to support on-going assessment of incidence of falls.
Public Health Wales may now seek to take on all or some of these roles. Taking no further role seems an untenable option. Falls are an important Public Health issue and one in which active involvement is essential.
9 Conclusions

Falls are already a significant burden upon health and health services in Wales and will only become a greater burden in the future as the size of the older population increases.

A coherent, high quality approach to falls prevention is now needed in Wales. Effective interventions exist, but these need to be implemented across the falls pathway.

The weight of the current guidance is behind the implementation of fall risk screening for older people. There is also a need for population level interventions to keep never fallers from falling for as long as possible.

At a tertiary level, the challenge is, as with many conditions suffered by older people, to reduce very long lengths of stay in hospital for older fallers who require admission.

Falls prevention will require investment and expectations of the effect of reduction in falls on the NHS as a whole need to be carefully managed. In addition, although falls are common, being able to detect a significant impact of falls prevention on the NHS in Wales is likely to be difficult in the short term.
10 Recommendations

Falls prevention in Wales needs to become high priority and proactive.

- Stand up against falling down

Too many people believe that falling is an inevitable part of ageing. It is not. NHS professionals and the general public need to be aware that falls can be prevented.

Although not discussed in any detail in this document, it seems reasonable to recommend that efforts are made to manage the often held belief amongst the public and health professionals that falls are an acceptable consequence of ageing and therefore cannot be prevented. Falls can be prevented and this realisation is an important part of individual and population level interventions being successful.

- Stop never fallers from becoming ever fallers

One of the simplest and most effective methods of falls prevention is exercise to improve strength and balance. Delivered at a population level, this can help to prevent people who have never fallen from falling.

- Take a proactive approach to risk assessment

Current NHS approaches wait for people to fall and hurt themselves before seeking to manage risk. By carrying out annual risk assessments in primary care, fall risk factors can be identified and modified before an injury occurs. This means that the burden of emergency care on the NHS is reduced.

Interventions need to be implemented at both individual and population level. Individual level multi-factorial risk assessment and intervention is needed to identify those at high risk of falling. In addition, population level exercise programmes are needed to maintain gait and balance in older people and reduce the risk of falling in those who have never fallen. This is also likely to have significant other beneficial health effects.

To manage individual level screening and assessment proposed algorithms are presented in this document. It seems reasonable, based on the evidence to suggest that these algorithms are used to carry out screening and assessment in primary care and, taking the ProFaNE approach, that those with fewer than two risk factors continue to be managed within primary care, whilst those with more than two risk factors are referred on for specialist assessment. This would then ensure that those at highest
risk receive specialised attention, but that specialist services are not overwhelmed.

The recommendation for annual individual level risk assessment is based upon expert opinion.

The recommendation for individual multi factorial assessment and intervention is based upon evidence from across the evidence hierarchy.

The recommendation for population level exercise is based upon.... It is predicted to reduce falls by .....

The recommendation for people with less than two risk factors to be managed in primary care and those with more than two risk factors to be referred for specialist assessment is based upon expert opinion.

- Take a ‘one day sooner’ approach to fallers admitted to hospital

Lengths of stay following a fall are long and place a significant burden upon the NHS. Analysis of admissions data suggest that reducing lengths of stay by just one day can reduce the NHS burden substantially; crude estimates suggest that a 0.5 day reduction per admission could save £1.9M p.a., with a 1 day reduction per admission saving £3.8M p.a.

This recommendation is based upon analysis of epidemiological data.

No explicit recommendation is made about the management of lengths of stay; there are many factors other than the fall itself that influence this process.

- Ensure that current practice is good practice

Evaluation of current services is also needed to ensure that current practice is good practice.
11 References


Macey, S. (2008). Personal communication from Denise Roberts, Project Manager Costing and Analysis, Financial Information Strategy


NICE (2004) Clinical practice guideline for the assessment and prevention of falls in older people. NICE.


12 Appendices

12.1 Appendix – All admissions

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<th>All External Causes</th>
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12.2 Appendix – Male and female falls

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12.3 Appendix – Falls by age group

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12.4 Appendix – Beddays

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12.5 Appendix – Deprivation related analysis

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<td>1.13 to 1.28</td>
<td>1.14 to 1.29</td>
<td>1.11 to 1.26</td>
<td>1.1 to 1.26</td>
</tr>
<tr>
<td>5 (most deprived)</td>
<td>1.27 to 1.46</td>
<td>1.2 to 1.36</td>
<td>1.21 to 1.38</td>
<td>1.17 to 1.33</td>
<td>1.06 to 1.22</td>
</tr>
</tbody>
</table>
### Admissions

<table>
<thead>
<tr>
<th></th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (least deprived)</td>
<td>702</td>
<td>755</td>
<td>772</td>
<td>799</td>
<td>716</td>
</tr>
<tr>
<td>2</td>
<td>794</td>
<td>707</td>
<td>866</td>
<td>907</td>
<td>771</td>
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<tr>
<td>3</td>
<td>873</td>
<td>807</td>
<td>930</td>
<td>916</td>
<td>821</td>
</tr>
<tr>
<td>4</td>
<td>836</td>
<td>824</td>
<td>895</td>
<td>869</td>
<td>776</td>
</tr>
<tr>
<td>5 (most deprived)</td>
<td>805</td>
<td>791</td>
<td>910</td>
<td>882</td>
<td>702</td>
</tr>
</tbody>
</table>

### Rate per 1000 popn

<table>
<thead>
<tr>
<th></th>
<th>2005</th>
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<th>2007</th>
<th>2008</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (least deprived)</td>
<td>10.0</td>
<td>10.8</td>
<td>11.0</td>
<td>11.4</td>
<td>10.2</td>
</tr>
<tr>
<td>2</td>
<td>10.7</td>
<td>9.6</td>
<td>11.7</td>
<td>12.3</td>
<td>10.4</td>
</tr>
<tr>
<td>3</td>
<td>11.9</td>
<td>11.0</td>
<td>12.7</td>
<td>12.5</td>
<td>11.2</td>
</tr>
<tr>
<td>4</td>
<td>13.7</td>
<td>13.5</td>
<td>14.7</td>
<td>14.3</td>
<td>12.7</td>
</tr>
<tr>
<td>5 (most deprived)</td>
<td>14.6</td>
<td>14.4</td>
<td>16.6</td>
<td>16.0</td>
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</table>

### Rate ratio

<table>
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<tr>
<th></th>
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<th>2007</th>
<th>2008</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (least deprived)</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>2</td>
<td>1.1</td>
<td>0.9</td>
<td>1.1</td>
<td>1.1</td>
<td>1.0</td>
</tr>
<tr>
<td>3</td>
<td>1.2</td>
<td>1.0</td>
<td>1.1</td>
<td>1.1</td>
<td>1.1</td>
</tr>
<tr>
<td>4</td>
<td>1.4</td>
<td>1.3</td>
<td>1.3</td>
<td>1.2</td>
<td>1.2</td>
</tr>
<tr>
<td>5 (most deprived)</td>
<td>1.5</td>
<td>1.3</td>
<td>1.5</td>
<td>1.4</td>
<td>1.2</td>
</tr>
</tbody>
</table>

### 95%CI

<table>
<thead>
<tr>
<th></th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (least deprived)</td>
<td>ref</td>
<td>ref</td>
<td>ref</td>
<td>ref</td>
<td>ref</td>
</tr>
<tr>
<td>2</td>
<td>0.97 to 1.18</td>
<td>0.8 to 0.98</td>
<td>0.96 to 1.17</td>
<td>0.98 to 1.18</td>
<td>0.92 to 1.13</td>
</tr>
<tr>
<td>3</td>
<td><strong>1.07 to 1.31</strong></td>
<td>0.92 to 1.13</td>
<td><strong>1.04 to 1.26</strong></td>
<td>0.99 to 1.2</td>
<td>0.99 to 1.21</td>
</tr>
<tr>
<td>4</td>
<td><strong>1.24 to 1.51</strong></td>
<td><strong>1.13 to 1.38</strong></td>
<td><strong>1.21 to 1.46</strong></td>
<td><strong>1.13 to 1.37</strong></td>
<td><strong>1.12 to 1.38</strong></td>
</tr>
<tr>
<td>5 (most deprived)</td>
<td><strong>1.32 to 1.61</strong></td>
<td><strong>1.21 to 1.47</strong></td>
<td><strong>1.36 to 1.65</strong></td>
<td><strong>1.27 to 1.54</strong></td>
<td><strong>1.12 to 1.38</strong></td>
</tr>
</tbody>
</table>
12.6 Appendix – Gait and balance assessment; detail of tests

1. Near tandem stand

**Background**

This is a measure of balance and ankle strength and involves testing whether the patient can stand with feet in a near tandem position for a period of 10 seconds with their eyes closed. Equipment required is a stopwatch and a 2.5cm square cardboard template for foot positioning.

**Procedure**

Demonstrate the position of the feet first and explain that the test involves standing in this position for 10 seconds with eyes closed. Allow the patient to choose which foot they place in the forward position for the test. Use the square template to separate the feet laterally by 2.5cm and the heel of the front foot 2.5cm anterior to the great toe of the back foot (see diagram at left). If the patient is unsteady, support them as they assume the test position. When they are in position and steady, remove your support and ask them to close their eyes and balance in that position without moving their feet, until you say "stop". Start timing from when they close their eyes. If a time of 5 seconds or less is obtained, a second trial is allowed and the better result is used as the final score.

Score

The patient must be able to balance in this position for at least 10 seconds to pass the test.

2. Sit to stand test

**Background**

This test involves timing how long it takes the patient to stand up and sit down five times from a seated position. Equipment required includes a 45cm high, straight-backed chair and a stopwatch.

**Procedure**

The patient is asked to perform the movements as quickly as possible with both arms folded in front. Demonstrate the test procedure first, emphasising the need to stand all of the way up until both knees and hips are fully extended and to sit all of the way down for each repetition. Ask the patient to place their feet directly below their knees at the start of the test and keep their arms folded across their chest for the duration of the test. Ask if they are ready and signal the start of the test by saying, "Go". Start timing from when the shoulders first move forwards and count aloud each repetition. Stop timing when they have completed five repetitions and are seated.

Safety: Make sure the chair doesn’t move back when the patient sits down by steadying it against a wall or with your hand.

Score

The patient must complete the task in less than 12 seconds to pass the test.

**Relevant references**

Guralnik JM et al (1994)
3. Timed up and Go

**Background**

The timed up and go test measures the time taken to stand up from a chair, walk 3 metres turn around and return to the chair.

**Procedure**

The patient is instructed to rise from a 46cm high (standard height) chair with arms, walk forward three metres at their usual walking pace to a marked line on the floor, turn 180 degrees, walk back to the chair and sit down. Timing starts when the person starts to rise from the chair and stops when they make contact with the chair on return.

**Score**

Cut points for predicting falls with the timed up and go test vary. A cut point of 10 seconds for community dwellers and 15 seconds for frailer individuals is recommended.

**Relevant references**

- Podsiadlo et al (1991)
- Shumway-Cook et al (2000)
### 12.7 Appendix – Case identification reporting form

<table>
<thead>
<tr>
<th>Screening</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Have you fallen in the past year?</td>
<td>Go on to full falls assessment</td>
<td>Carry out balance and gait assessment</td>
</tr>
</tbody>
</table>

#### Ask question or carry out test

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you have any problems with walking or balance</td>
<td>Go on to full falls assessment</td>
</tr>
</tbody>
</table>

**OR**

<table>
<thead>
<tr>
<th>Held for less than 10 s</th>
<th>Held for more than 10s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Near tandem stand</td>
<td></td>
</tr>
<tr>
<td>Actual time:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Go on to full falls assessment</td>
</tr>
</tbody>
</table>

**OR**

<table>
<thead>
<tr>
<th>Completed in more than 12 seconds</th>
<th>Completed in less than 12 seconds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sit to Stand test</td>
<td></td>
</tr>
<tr>
<td>Actual time:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Go on to full falls assessment</td>
</tr>
</tbody>
</table>

**OR**

<table>
<thead>
<tr>
<th>Completed in more than 10 seconds</th>
<th>Completed in less than 10 seconds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Timed up and go</td>
<td></td>
</tr>
<tr>
<td>Actual time:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Go on to full falls assessment</td>
</tr>
</tbody>
</table>
12.8 Appendix – MMSE

Awaiting
12.9 Appendix – Geriatric Depression Scale – Short Form


A self-administered depression scale for those over 65 which measures depression in the elderly

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are you basically satisfied with your life?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Have you dropped many of your activities and interests?</td>
<td>YES</td>
<td>no</td>
</tr>
<tr>
<td>Do you feel that your life is empty?</td>
<td>YES</td>
<td>no</td>
</tr>
<tr>
<td>Do you often get bored?</td>
<td>YES</td>
<td>no</td>
</tr>
<tr>
<td>Are you in good spirits most of the time?</td>
<td></td>
<td>NO</td>
</tr>
<tr>
<td>Are you afraid that something bad is going to happen to you?</td>
<td>YES</td>
<td>no</td>
</tr>
<tr>
<td>Do you feel happy most of the time?</td>
<td></td>
<td>NO</td>
</tr>
<tr>
<td>Do you often feel helpless?</td>
<td>YES</td>
<td>no</td>
</tr>
<tr>
<td>Do you prefer to stay at home, rather than going out and doing new things?</td>
<td>YES</td>
<td>no</td>
</tr>
<tr>
<td>Do you feel you have more problems with memory than most?</td>
<td>YES</td>
<td>no</td>
</tr>
<tr>
<td>Do you think it is wonderful to be alive now?</td>
<td></td>
<td>NO</td>
</tr>
<tr>
<td>Do you feel pretty worthless the way you are now?</td>
<td>YES</td>
<td>no</td>
</tr>
<tr>
<td>Do you feel full of energy?</td>
<td></td>
<td>NO</td>
</tr>
<tr>
<td>Do you feel that your situation is hopeless?</td>
<td>YES</td>
<td>no</td>
</tr>
<tr>
<td>Do you think that most people are better off than you are?</td>
<td>YES</td>
<td>no</td>
</tr>
</tbody>
</table>

Score: _______ (Number of "depressed" answers - ones that are bold)

Answers in bold indicate depression.

For clinical purposes a score over 5 points is suggestive of depression and should warrant a follow-up interview. Scores over 10 are almost always depression.

Note: This is a self-report inventory. The validity of the result depends entirely on your honesty.
### 12.10 Appendix – Falls Efficacy Scale International (FES-I)

**FES-I**

Now we would like to ask some questions about how concerned you are about the possibility of falling. Please reply thinking about how you usually do the activity. If you currently don’t do the activity (e.g. if someone does your shopping for you), please answer to show whether you think you would be concerned about falling IF you did the activity. For each of the following activities, please tick the box which is closest to your own opinion to show how concerned you are that you might fall if you did this activity.

<table>
<thead>
<tr>
<th></th>
<th>Not at all concerned</th>
<th>Somewhat concerned</th>
<th>Fairly concerned</th>
<th>Very concerned</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cleaning the house (e.g. sweep, vacuum or dust)</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>Getting dressed or undressed</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Preparing simple meals</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>Taking a bath or shower</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>Going to the shop</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>Getting in or out of a chair</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>Going up or down stairs</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>8</td>
<td>Walking around in the neighbourhood</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>9</td>
<td>Reaching for something above your head or on the ground</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>10</td>
<td>Going to answer the telephone before it stops ringing</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>11</td>
<td>Walking on a slippery surface (e.g. wet or icy)</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>12</td>
<td>Visiting a friend or relative</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>13</td>
<td>Walking in a place with crowds</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>14</td>
<td>Walking on an uneven surface (e.g. rocky ground, poorly maintained pavement)</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>15</td>
<td>Walking up or down a slope</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>16</td>
<td>Going out to a social event (e.g. religious service, family gathering or club meeting)</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

*FES-I: Prof Lucy Yardley and Prof Chris Todd*
Instructions for analysis

Sum scores –

16 = no fear of falling

64 = severe fear of falling

Discard form if more than 4 missing answers

If 13 to 15 questions answered, calculate total score for questions answered, divide by number of questions answers and multiply by 16. Round answer to nearest whole number.

Mean scores and standard deviations of Fall Efficacy Scale International in community living older persons according to age and sex.*

<table>
<thead>
<tr>
<th>Age</th>
<th>Male</th>
<th></th>
<th>Female</th>
<th></th>
<th>Total</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>Mean</td>
<td>SD</td>
<td>N</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>&lt; 70-74</td>
<td>40</td>
<td>23.1</td>
<td>7.9</td>
<td>53</td>
<td>25.8</td>
<td>8.8</td>
</tr>
<tr>
<td>&lt; 75-79</td>
<td>25</td>
<td>26.0</td>
<td>10.1</td>
<td>41</td>
<td>31.2</td>
<td>12.7</td>
</tr>
<tr>
<td>&lt; 80+</td>
<td>17</td>
<td>26.9</td>
<td>11.5</td>
<td>37</td>
<td>34.3</td>
<td>12.8</td>
</tr>
<tr>
<td></td>
<td>82</td>
<td>25.2</td>
<td>9.6</td>
<td>131</td>
<td>29.0</td>
<td>11.8</td>
</tr>
</tbody>
</table>

Mean scores from Kempen et al, 2007.