Accidental Injury Task Force’s
Working Group on Older People

Priorities for prevention

December 2001
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Executive Summary

The purpose of this report is to propose priorities for the prevention of accidental injury amongst people.

Older people have a higher rate of accidental injury resulting in hospitalisation or death than any other age group. For both sexes, the age-specific death and admission rates for injury increase 'exponentially' with increasing age for women over 55 and men over 65. Most non-fatal accidental injury to older people occurs in the home.

Falls (62%), road traffic accidents - RTAs (13%) and fires / burns (3%) cause the largest number of fatal injuries amongst older people. The proportion of fatal injuries recorded as falls increases with age – 78% of accidental injury deaths for people aged 85 and over. Other external causes, responsible for 3% or less of accidental injury deaths, include environmental causes, foreign bodies, and poisonings. Falls (71%) and transport accidents (3%) are principal causes of admission to hospital for serious accidental injury for people aged 65 and over. All other external causes are responsible for less than 3% of injury admissions. Fracture was the recorded cause of death in 52% of fatal injuries.

Amongst men aged 65 and over the rates of accidental injury resulting in attendance at a hospital or consulting a doctor were similar for non-manual and manual social classes. For women, the rates were higher for the non-manual than for manual social classes. If one considers only serious fracture injuries, and in particular fractures of the proximal femur, no significant associations were found between the rates of admissions for these injuries and deprivation. There is a variation across the country in the mortality rates for accidental injury and the hospital episode rates in older people for fracture of the proximal femur.

Priorities for prevention

The Working Group developed a table to aid priority setting (Appendix 1). Recommendations on priorities for injury prevention were based on burden of injury and evidence of effectiveness. Falls and fractures, road traffic accidents, and dwelling fires were identified as priorities.

The research evidence was synthesised to produce the proposed approach to prevention. In some instances, the Working Group has been able to refer to guidelines produced through systematic review. In others, the evidence base has been interpreted by the Working Group to produce a recommended intervention programme.

Targets for the prevention of accidental injury have been included in a number of recent Government strategies. Additionally, within the National Service Framework for Older People (NSF-OP), standards have been included to reduce the number of falls that result in serious injury and ensure effective treatment and rehabilitation of those who have fallen. Nevertheless, the profile of accidental injury prevention needs to be raised on the NHS agenda, and multi-agency, cross-boundary working encouraged.
Falls & Fractures

Falls and fractures are associated with high morbidity, mortality and substantial costs. In 1999, there were over 3,000 deaths and over 85,000 serious injuries as a result of falls in older people. The consequences of falling include not only death and injury (the most serious of which is fracture of the proximal femur), but also institutionalisation, fear (of a future fall), decreased activity, functional deterioration, social isolation, depression and reduced quality of life.

Factors related to falling have been classified into two types: intrinsic and extrinsic factors. Intrinsic factors are states or traits of an individual that increase their risk of falling. They are more important among the older groups, eg. people aged 80 and over. Extrinsic factors are social and physical factors that relate to the external environment. Falls among people aged 65-74 years are more likely to be due to extrinsic factors than for those aged 75 and over. The changing interaction between the older person and their environment as they age is important. An important aspect of maintaining function and protecting against falls is physical activity. When strength, muscle power, flexibility, co-ordination and balance decline, functional capacity is compromised. In such circumstances, the older person is less able to prevent a slip, trip or stumble becoming a fall.

In the UK, osteoporosis results in over 200,000 fractures each year, causing severe pain and disability to individual sufferers at an annual cost to the National Health Service (NHS) of £1.7 billion. More than one-third of adult women will sustain one or more osteoporotic fractures in their lifetime. Lifetime risk in men is approximately half that in women. Hip fractures alone account for more than 20% of orthopaedic bed occupancy in the UK, and they account for the majority of the direct health service cost of osteoporosis.

Taking account of the ageing of the UK population, it is estimated that there will be a doubling of the number of osteoporotic fractures over the next 50 years if changes are not made in present practice. Bone mineral density, liability to fall and types of fall contribute to the risk of fracture. Epidemiological studies have shown, with varying degrees of certainty, that lack of physical activity undertaken at all ages, smoking and low dietary calcium intake are associated with osteoporosis.

The literature on what works to prevent falls has been summarised in a number of reviews. Department of Health (DH) funded guidelines for the prevention of falls were produced in 1998, and an abridged version was published in the British Medical Journal in 2000. Very recently, a trans-Atlantic collaboration resulted in the production of clinical practice guidelines, published during spring 2001. These guidelines are, on the whole, consistent with each other. They include the following recommended approach to prevention, which is in broad agreement with that presented in the National Service Framework for Older People (NSF-OP).

To prevent accidental injury and their sequelae amongst older people, potential strategies for prevention include:

- Reduce the risk of falls occurrence;
- Strengthen the older person’s bones, so that if a fall does occur the risk of fracture is reduced;
• Reduce the energy of impact;
• Improve coping strategies following a fall.

The first of these leads to a consideration of the prevention of falls amongst older people, and the second to the prevention and treatment of osteoporosis. The third leads to consideration of the use of hip protectors and other strategies that reduce the transfer of kinetic energy to the body, in particular the skeleton, and the fourth to appropriate training and rehabilitation.

The strategic approach to falls and fracture prevention is in three stages:
• Identification of at-risk groups of older people
• Detailed assessment of older people within these groups to identify whether they are at increased risk of falling or fracturing
• Facilitate intervention to address the risk factors identified.

Road Traffic Accidents

Among people aged 65 and over, motor vehicle traffic accidents were responsible for around one in eight deaths and one in fifty admissions for serious accidental injury. In 1999, 859 people aged 60 and over died on the roads of Great Britain, and 5,038 were seriously injured.

Amongst those killed or admitted to hospital as a result of vehicle-related accidents, the older person was most likely to be injured or killed as a pedestrian, less frequently as a driver or a passenger, and far less frequently as a cyclist or motorcyclist. Older people account for a disproportionate share of pedestrian fatalities.

Rates of road traffic accidents, expressed per distance driven, increase beyond age 60. Older people (be they pedestrians or other road users) are much more vulnerable to injury in the event of a crash and do no recover as quickly. The available evidence indicates that in a crash, older drivers are more likely to be killed or seriously injured than people of other ages. Those over 75 years are three times more likely to die than 20 year olds; those over 80 are up to 6 times more likely to die. The number of older drivers is increasing, particularly amongst women.

There have been some general changes coincident with declines in road related serious injuries. They are: the reduction in exposure of vulnerable road users; better protection afforded by newer model cars, as well as seat belt wearing and airbags; safer roads resulting from new road construction and local safety measures (eg. traffic calming, improvement to junction layouts); and anti-drink-drive measures.

Although the government's road safety strategy Tomorrow's roads: safer for everyone does not focus on the older driver and older pedestrians specifically, the measures it is introducing are expected to improve the road environment for all users. The key elements are to: achieve driving speeds appropriate to conditions; make safety the main objective of improvements in the road infrastructure; reduce drink- and drug-driving; improve vehicle safety; and improve training and testing.
Older pedestrians.

In 1998, 422 pedestrians aged 60 and over died and 6554 were injured. Amongst injuries resulting from motor vehicle traffic accidents to people aged 65 and over, 52% of those killed and 37% of those admitted to hospital with serious injury were pedestrians. The number of pedestrian casualties killed and seriously injured recorded by the police has declined consistently over the period 1990 to 1998 in each age group, despite population increases in each of these groups.

Over 90% of pedestrian casualties are sustained whilst crossing the street. Factors that increase the risk of accidental injury amongst pedestrians include traffic speed, crossing design, and the judgement and road experience of the older person.

There are a number of interventions that benefit the older pedestrian, as well as the disabled person, and these include: traffic calming, pedestrian areas (ie. physically separating the pedestrian from traffic hazards), pedestrian crossings designed to meet the needs of slow walkers / wheelchair users, and stippled stones at crossings to alert the visually impaired.

The Transport Research Laboratory (TRL) have estimated that the introduction of 20 mph zones reduce pedestrian casualties (all ages) by 43%, and traffic safety schemes reduce pedestrian casualties by 25%. Additionally, the TRL have estimated a potential 50% casualty reduction through improved pedestrian facilities including priority walking routes, improved crossing facilities - located where the pedestrians need them, and timings attuned to the needs of pedestrians.

Older car occupants.

Amongst people aged 60 years and over, 371 were killed and 19,763 injured as car occupants. Amongst injuries resulting from motor vehicle traffic accidents to people aged 65 and over, 42% of those killed and 51% admitted to hospital with a serious injury were vehicle occupants. The number of drivers killed and seriously injured recorded by the police has declined over the period 1990 to 1998 for those aged 60-69 and 70-79, but not for people aged 80 years and over. Casualties over 80 have increased by 47%, which is a reflection of the 59% increase in the population over this period.

Recent evidence suggests that older people who develop age-related health problems are more likely to experience difficulties walking and using public transport before experiencing difficulties with driving. Older drivers tend to be safer than is commonly believed. A major reason for older people’s over-representation in some casualty data is their increased frailty and heightened vulnerability to injury if involved in a road accident. Older drivers do not pose a particular threat to other road users. Infrastructure improvements designed to reduce road traffic accident casualties amongst all road users are likely to have a particularly beneficial impact on reducing accidents involving older road users, at no additional cost.

Interventions include changes both to the physical infrastructure (including vehicle design) and to regulatory and administrative policies, and include promotion of the use of new safety technology for vehicle use by older persons.

Safety improvements to the design of vehicles can have beneficial effects on both primary safety (reducing the number of accidents) and secondary safety (reducing injuries once an
accident has happened). Improvements to primary safety (brakes, tyres, steering and lighting) will no doubt continue to be made and will be of benefit to drivers of all ages. Aspects of vehicle design that is likely to be of particular benefit to the older driver include: seat belts and airbags designed for the needs of older people; side impact protection systems; power assisted steering; and in-vehicle telematics, eg. night vision, collision avoidance and adaptive cruise control.

The ageing process may include the development of functional impairments that cause driving difficulties. Infrastructure improvements and modifications that would assist older drivers include: dedicated turn-across-traffic lanes and traffic signals allowing protected turns; better sign luminance to counteract loss in legibility distance; better placement of signs; larger sign symbols (with symbols preferred to text); more relevant, conspicuous, and timely information about required driving manoeuvres; speed reduction through road design or traffic controls where complex maneuvers are required.

There is increasing recognition that some medications commonly prescribed to older people (eg. benzodiazepines, tricyclic antidepressants, opiates) have the unwanted side effect of making the user drowsy during the daytime. Proposed advice to drivers includes the particular problems of alcohol and of tiredness for the older person, and the dangers of some medicines. Advice for older drivers is also provided by the Forum of Mobility Centres, which aim to help older and disabled people achieve independent mobility as drivers, passengers and wheelchair users.

**Dwelling fires**

Fire / burns are the cause of 3% of accidental injury deaths amongst older people. The vast majority of fires affecting older people are dwelling fires. Among people aged 65 years and over, there were 219 deaths and over 3,000 casualties in the UK in 1999 as a result of fire. The rate of death and injury increases with age, with those aged 80 and over at substantially greater risk. Older people are less likely to have fires, but are more likely to be killed or injured if they do so.

Major causes of fire deaths and injury amongst older people were smoking, heating, cooking (including chip pan fires), and electrical fires (including electric blanket fires). The following factors have been found to put an older person at particular risk of burns: physical disabilities, psychiatric illness, impaired vision and smell, alcohol use, medicine use, and smoking. Extrinsic factors include the use of flammable garments and flammable furniture, the absence of smoke alarms, the use of gas cookers, as well as older people living in poverty and/or in rural areas. There are more fires where older people live on lower incomes or in rented accommodation.

Observational study evidence indicates that a reduction in smoking prevalence would reduce fire injury and deaths. The use of smoke detectors reduces fire injuries and death. There is evidence from the USA that a community (all age) smoke alarm give-away programme can achieve reductions in house fires. Evidence from a community (all age) study in Camden suggests that give-away programmes alone are ineffective and require back up through installation. There is observational study (weak) evidence that the replacement of electric blankets that are over 10 years old would prevent many electric blanket fires.
To facilitate prevention activities, the National Community Fire Safety Centre (NCFSC) was established in September 1998. Its principal aim is to develop a coordinated and sustained national strategy for delivering fire safety awareness and education. Working with the fire service, its representative organisations and the wider fire industry, the NCFSC is involved in a programme of action that includes:

- developing and evaluating a programme of national fire safety publicity campaigns to meet specific domestic fire risks and trends;
- providing a toolbox of community fire safety programmes and resources which can be used by brigades, and contains examples of best practice on the implementation and evaluation of community fire safety initiatives;
- establishing partnerships and networks with national and community-based organisations, agencies and other government departments, particularly targeting the hard-to-influence groups.

Community Fire Safety Units have been established at brigade level, involving a large number of dedicated professionals with a range of experience and disciplinary backgrounds. All brigades now produce a strategic, data-driven Community Fire Safety Plan as part of the refocusing of the service. These plans outline clearly a programme of prevention activities. The main focus is accidental dwelling fires.

**Final Remarks**

The Accidental Injury Task Force Working Group on Older People identified falls, fractures, accidental injury to the older pedestrians and the older car occupants, and domestic fires as priorities for prevention. They also identified options for prevention and made assessment of these options in terms of strength of evidence, the burden of injury, the contribution to inequalities, the cost of the intervention and the practicability of implementation (see Appendix 1). Additionally some intervention issues were highlighted.
Accidental Injury Task Force’s
Working Group on Older People

Priorities for Prevention

1. Background

The Accidental Injury Task Force (AITF) was convened to advise the Chief Medical Officer on the prevention of accidental injuries. At its second meeting on 26 February 2001, it agreed to set up three working groups on children, older people and measuring and monitoring injury. The terms of reference of the Working Group on Older People are:

- Taking account of Saving Lives, the National Service Framework for Older People, and other relevant initiatives, to advise the Accidental Injury Task Force by its next meeting on 25 June on:
  - The most important priorities for action to reduce the burden of accidental injury among older people
  - How such action would reduce health inequalities.
  - What further work might be undertaken after 25 June by the working group on
    - medium-term actions requiring further information or development
    - longer-term actions requiring further research
    - the development of an implementation plan for immediate actions
    - delivery structures to take forward the implementation plan.

Since that meeting of the AITF, the Health Development Agency (HDA) commissioned a report to describe what works in the prevention of accidental injury amongst older people – referred to as ‘What Works’. This has formed the basis of the deliberations of the working group.

The purpose of this report is to propose priorities for prevention of accidental injury amongst older people.

In order to achieve this, the size of the problem has been described and the major causes of accidental injury amongst older people identified. The epidemiology of accidental injury for each of these causes has been summarised, and what we know about the cause of these events described.

For the three major external causes of accidental injury (falls, road traffic accidents (RTAs) and domestic fires), interventions that have been judged to be effective are presented. This information was synthesised to produce strategies for prevention for each area.
The contents of this report are based on ‘What Works’, and work carried out for the DH by the rapporteur (CC) 5 6. Following the first meeting of the Working Group, a table of interventions was drafted (see Appendix 1). This table includes a statement of the intervention, and assessments of the strength of evidence for effectiveness, the likely contribution to reducing the burden of injury, the likely contribution of the intervention to reducing inequalities, its likely relative cost, and its implementability. At the Working Group’s second meeting, the contents of the table were used to identify priorities for prevention, and to agree the layout of the report. Since the second meeting, the report has been drafted, shared with Working Group members and revised following comments received.

The report includes only limited material on implementation issues.
1.1 Epidemiology of accidental injury to older people

The size of the problem

Injury is a leading cause of premature mortality and morbidity, and many injuries are preventable. Accidents often result in injuries that do not pose a threat to life. On the other hand, they can result in severe and often life threatening conditions, which sometimes lead to death, or to survival with severe disability or a reduced quality of life.

Older people have a higher risk of accidental injury resulting in hospitalisation or death than any other age group. Over 50% of accidental injury deaths occur to older people aged 65 and over, who are more than eight times as likely to die as a result of accidental injury than children under 15 years.

The spectrum of accidents and injury has been likened to a pyramid (Figure 1). For each injury death, there are about 40 hospital inpatient episodes resulting from an injury, 400 Accident and Emergency department attendances and 400 visits to their general practitioner for injury. However, the vast majority of accidental injuries are largely unseen or unrecorded resulting in self-treatment or no treatment.

Figure 1: The proportions of accidents amongst older people resulting in death, admission, attendance at A&E department and visits to the General Practitioner

Based on ONS Mortality Statistics, Department of Health Hospital Episode Statistics, DTI’s Home and Leisure Accident Statistics, and Morbidity Statistics from General Practice.
The patterns of occurrence of accidental injury

Age, and sex

For both sexes, the age-specific accidental injury death and serious accidental injury rates increase 'exponentially' with increasing age for men and women over 65 (Figures 2 and 3).

Figure 2: Age-specific death rates for accidental injury in England (Source: ONS 1999)

[Graph showing age-specific death rates by age and sex]

Age-specific injury death rates are greater for men than for women at all ages, but rates of hospital admissions are greater for women than men after age 65. The rates of injury that result in any form of medical treatment are greater for women than for men beyond age 65.

Figure 3: Age-specific hospitalisation rates of serious accidental injury (length of stay of 4 days or more) in England (Source: HES 1999/2000)

[Graph showing age-specific hospitalisation rates by age and sex]
**Place of occurrence**

Figure 4 shows that the pattern of place of occurrence of fatal accidental injuries (excluding transport-related) among older people changes according to age and sex. Most non-fatal accidents to older people occur in the home. There were approximately 4,000 accidental injury deaths in the home in 1999 in the whole population. 47% of the deaths were people aged 65 and over who account for 16% of the population.

*Figure 4: Place of occurrence of accidental injury deaths (Source: OPS 1999)*

The above figures do not include transport accidents or accidental injuries that occurred during surgical/medical care. In regard to the former, in 1999 there were 362 deaths to males and 323 deaths to females aged 65 and over (14% overall) as a result of transport accidents.
The proportion of accidents requiring medical care that occur in the home increases with age. For those aged 65 and over, around 60% of these accidents occur in the home (including residential accommodation), and 20% on a street or highway\(^9\)\(^{10}\).

Most older people in the UK (95%) live in their own homes, and older people spend more time in the home than other groups. However, accidents in residential homes or in hospitals form a disproportionately large part of the total accident burden. In the early 1990s, although 5% of people live in hospital, nursing homes, or in residential care homes, 16% of the falls resulting in attendance at Accident and Emergency Departments, as well as a similar proportion of falls deaths, occur to people living in these places\(^{11}\)\(^{12}\). Although the figures may have changed during the 1990s, rates of falls in hospital, nursing homes and residential care homes are much higher than those amongst community-dwelling older people.

**Time trends**

**Figure 5: Age standardised 3-year average death rates from accidental injury for people aged 65 and over (Source ONS 1999)**

Age-standardised death rates from accidental injury declined during the 1970s and 1980s (Figure 5). Rates appeared to plateau during the 1990s with a suggestion of a slight increase at the end of that decade. No clear explanation for this trend is apparent.
Nature of injury

The most commonly coded injuries resulting in death or hospital admission among those aged 65 and over are fractures of the lower limbs. In 1999, 52% of accidental injury deaths had a primary diagnosis of fracture (Appendix 2, Table A1). For 38% of accidental injury deaths, the primary diagnosis was fracture of the lower limb, for 20% it was either skull fracture or intracranial injury, and for 9% it was internal injury. Amongst the admissions to hospital for serious accidental injury in 1999/2000, 43% had a principal diagnosis of injuries to the hip and thigh (many of which were fractures) and a further 10% were injuries to the knee or lower leg (Appendix 2, Table A2). Complications of surgical or medical was the diagnosis in over 19% of admissions for serious accidental injury. Head injuries were responsible for 6%, back injuries 6%, and injuries to the arm 9%.

Socio-economic factors

Amongst older people, associations exist between occupational class and chronic disease prevalence, self-assessed health, and functional disability, where class is assigned on the basis of last or main occupation. This is true for both men and women. There are also associations between self-assessed health, educational qualifications and material wealth. There was no apparent independent effect, however, between current income and disability. Arber and Ginn concluded that previous occupational class was a more important determinant of poor health than current income.

Based on previous occupation, the variation in rates of accidents between manual and non-manual occupational classes was not consistent between older males and older females. It was found that amongst people aged 65 and over the rates of accidental injury resulting in attendance at a hospital or consulting a doctor was similar for non-manual and manual social classes among males. For females, the rates were higher for the non-manual than for manual social classes.

There were higher rates of admissions to hospital for injury for those living in the most deprived areas (Quintile 5) as classified by the Townsend Index (see Figure 6a) than the least deprived (Quintile1). However, if one considers only serious fracture injuries, and in particular fractures of the proximal femur, no significant associations were found between the rates of admissions for these injuries and deprivation (Figures 6b and 6c). One explanation for this might be that consulting a doctor or attendance at, and / or admission to hospital for less severe injuries are influenced by social and access factors, as well as factors relating to health service provision, whereas the more severe injuries are not influenced to the same extent.
Figure 6: Hospital admission rates of accidents (all causes) for each of 5 deprivation levels.

(a) All Causes, All Admissions (Males and Females)

(b) All Causes, Long Bone Fractures (Males and Females)

(c) All Causes, Fracture of Proximal Femur (Males and Females)
**Ethnicity**

Research into ethnic differences in health for people aged 65 and over is sparse largely because the number of people from ethnic minorities in this age group is too small for reliable research\(^\text{13}\). As the population within ethnic minority groups ages, and the body of research grows, initiatives to reduce any disadvantage should be considered. Additionally, it is still essential to gather input about how injury prevention goals and objectives might reflect ethnic minority views.

**Geographic variations**

There is a variation in the mortality rates for accidents and the hospital episode rates in older people for fracture of the proximal femur across health authorities (Source: Compendium of Clinical and Health Indicators 2000).

**The major causes of accidental injury**

Falls (62%) and traffic accidents (13%) have the highest mortality rates in older people (Figure 7). Fire/burns, natural and environmental factors and drowning/choking are also responsible for a substantial number of fatal accidental injuries.

**Figure 7: The distribution of accidental injury deaths by external cause of injury, aged 65 and over (Source: ONS 1999)**

![Pie chart showing accidental deaths by type of accident, ages 65 and over.](chart.png)
From Figure 8 it can be seen that falls are a much more important cause for those aged 75-84, and are by far the most important cause for those aged 85+.

**Figure 8: Age-specific mortality rates of accidents amongst older people in 1999 by cause**

The pattern of cause of injury death (unintentional and intentional) is different for men and women. For men, although falls are the largest cause, motor-vehicle traffic crashes are responsible for a significant proportion (17%) of accidental injury deaths. For women, falls are a much more important cause of death than other causes, although 10% of accidental injury deaths are classified to motor vehicle traffic accidents.
Falls are a principal cause of serious accidental injury (resulting in 4 or more days stay in hospital - 71% of all serious accidental injury) in people aged 65 and over (Figure 9). Falls are the most important cause of injury, for older people, leading to attendance at an A&E department or a visit to a general practitioner.\(^9\)

**Figure 9: The major causes of hospital admission for serious accidental injuries among people aged 65 and over in England (Source HES 1999/2000).**
Outcomes

Important outcomes resulting from the occurrence of accidental injury are disability and death. Disability is very difficult to measure, and only limited information is available from routine sources. Table 1 shows the information derived from the latest disability survey, which indicates that a significant proportion of disability results from accidental injury.

Table 1: Percentage of adults with a disability for whom at least one disability was caused by accidental injury.

<table>
<thead>
<tr>
<th></th>
<th>16-24</th>
<th>25-34</th>
<th>35-44</th>
<th>45-54</th>
<th>55-64</th>
<th>65-74</th>
<th>75-84</th>
<th>85+</th>
<th>Total</th>
</tr>
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<tbody>
<tr>
<td>Male</td>
<td>7</td>
<td>21</td>
<td>27</td>
<td>18</td>
<td>15</td>
<td>13</td>
<td>9</td>
<td>10</td>
<td>15</td>
</tr>
<tr>
<td>Female</td>
<td>7</td>
<td>12</td>
<td>17</td>
<td>13</td>
<td>10</td>
<td>9</td>
<td>9</td>
<td>16</td>
<td>11</td>
</tr>
</tbody>
</table>

The focus of the report

Examination of the statistics relating to the most severe accidental injuries (deaths and hospital admissions with a length of stay of 4 or more days) leads naturally to a consideration of 3 groupings, namely: falls, road traffic accidents, and residential fires. The mortality and serious injury burden for each of these are shown in Table 2.

Table 2: The major causes of deaths and serious accidental injury amongst people aged 65 and over.

<table>
<thead>
<tr>
<th>Cause</th>
<th>Mortality (ONS 1999)</th>
<th>Serious injury (HES ’99/00)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Falls</td>
<td>3,081</td>
<td>62</td>
</tr>
<tr>
<td>Land Transport</td>
<td>685</td>
<td>13</td>
</tr>
<tr>
<td>Fires / Burns</td>
<td>141</td>
<td>3</td>
</tr>
</tbody>
</table>
1.2 Falls and Fractures

Falls and fractures are associated with high morbidity, mortality and substantial costs. Sixty two percent of accidental injury deaths and 71% of hospital admissions for serious accidental injury are due to falls (Table 2).

The patterns of occurrence of falls resulting in serious injury or death

Age and sex

Figures 10 and 11 show that the rates of falls injury resulting in death and serious injury increases with age for both older men and women. The rate of serious accidental injury for women is much greater than that for men. Without effective intervention, demographic trends alone will result in substantial increases in the number of falls, falls injuries, and fall-related deaths amongst older people.

Figure 10: Age specific mortality rates for falls in England (Source: ONS 1999)
**Place of occurrence**

The place of occurrence of many accidental injury deaths are unspecified (Figure 12). Amongst those that are specified, the home and communal establishments were the recorded place of occurrence for many falls deaths. Communal establishments are more commonly coded place where falls occur in people aged 75 and over compared with people aged 65-74.
Figure 12 Accidental injury deaths by place of occurrence, England, 1997-9 pooled data (Source ONS)

(a) Males, aged 65-74  
(b) Females, aged 65-74  

(c) Males, aged 75 and over  
(d) Females, aged 75 and over  

The above figures do not include transport accidents or accidental injuries that occurred during surgical/medical care.
Nature of injury

The vast majority of injury deaths that result from falling have a principal diagnosis of fracture of lower limb (Table A5, Appendix 2). Fractures account for the vast majority of falls deaths amongst older people. Another important cause of death from falls is intracranial injury.

The pattern of the nature of serious injury looks somewhat different, partly due to the different coding frames that are used for death (ICD9) and hospital episodes (ICD10). Nevertheless, like deaths, for many of these serious injuries resulting from falls the principal diagnosis is injury to the lower limb (principally the hip and thigh), and many of these are fractures. Additionally, a significant proportion of falls result in serious injury to the following body areas: the head, lower body (including lumbar spine and pelvis), shoulder, upper and lower arm.

Falls (with or without injury)

The following rates of falling (per year) have been found: 1 out of 3 people aged 65 and over living in the community, 1 out of 2 people aged 85 and over, 1 out of 2 people living in institutions, 1 out of 2 people with dementia, 2 out of 3 people living in nursing homes.

People with dementia are more likely to have other risk factors for falling than those without dementia. Falls amongst people with dementia are more likely to result in serious injury; they recover less well and are five times more likely to be institutionalised.

Physiotherapy can help to improve mobility skills amongst people with dementia.

Falls are the most important type of accident in and around the home amongst older people. It has been estimated that 60% of falls to people aged 65-74 occur in the home, and 85% for people aged 85 and over.

The rate of falling does not appear to increase for older people living in areas of deprivation; however, there is a geographic variation in falls injury and mortality rates.

The consequences of falling include death, injury (the most serious of which is fracture of the proximal femur), institutionalisation, fear (of a future fall), decreased activity, functional deterioration, social isolation, depression and reduced quality of life.

Risk factors

Factors related to falling have been classified into two types: intrinsic and extrinsic factors. Intrinsic factors are states or traits of an individual that increase their risk of falling. They are more important among the older groups, eg. people aged 80 and over. Extrinsic factors are social and physical factors that relate to the external environment. Falls among people 65-74 years are more likely to be due to extrinsic factors than for...
those aged 75 and over. The changing interaction between the older person and their environment as they age is important.

Extrinsic factors

The size of the impact that environmental factors have on the risk of falling amongst older people is uncertain. Some have reported that between a third and a half of falls among community dwelling older people are due to environmental causes. Others have reported that 20% of falls are due to major external factors (ie. those that would cause any healthy adult to fall). Falls amongst older people most often occur whilst standing, or walking on level or uneven surfaces.

The evidence is unclear regarding the precise role the environment has in increasing the risk of falls. Some have suggested that many different parts of the external environment are associated with falls. Studies have found over 50 different potential hazards:

- 2 or more hazards can be found in most older person’s homes
- 2 or more hazards can be found in 60% of bathrooms

Others have found that most falls that occur are not associated with these hazards.

Specific environmental factors associated with increased falls (injury) risk include bathtubs and showers without grab bars and non-slip mats. Other factors that may be associated include loose carpets, poor lighting, steps and stairs that are not clearly distinguishable, and stairs without banisters / rails.

Intrinsic risk factors

The main classes of intrinsic factors that influence the risk of falling are: strength, balance, gait, physical performance, physical functioning, underlying ill-health/medical conditions, sensory declines, medicine use, and mental functioning. There is a complex causal net linking risk factors and falls occurrence. Intervening against predisposing impairments simultaneously protects against functional dependence as well as falls and incontinence.

Physical activity and function

Much of the information below comes from the Allied Dunbar National Fitness Survey and the Health Education Authority (HEA) survey on Activity and Health. An important aspect of maintaining function and protecting against falls is physical activity. Physical activity declines with age. Only 1 in 6 women and 1 in 4 men aged 50 and over take the recommended amount of physical activity to benefit their health (ie. 30 minutes of moderate intensity activity on at least 5 days a week). By the age of 74, only 1 in 7 people take enough physical activity to benefit their health. Two in 5 of all men and women over 50 are sedentary (ie. do 30 minutes of moderate intensity activity less than once a week). The proportion of sedentary women increases with age from around 1 in 3 women aged 50-54 to 2 in 3 women aged 80 and over. More specific examples are that:
1 in 3 women and 1 in 4 men over 70 are unable to walk 400 metres on their own.
1 in 2 women aged 70-74 do not have a lower limb power/weight ratio sufficient to climb a 30cm step without help.
1 in 4 women and 1 in 14 men aged 50 and over are unable to climb stairs easily
1 in 4 women and 1 in 14 men aged 70-74 do not have sufficient knee extension (quadriceps) strength/weight ratio to be confident of getting out of a low chair without using their arms as well.

A proportion of this disability is due to disuse rather than disease. The decline in strength and endurance (both reduce by 10% per decade), and muscle power (reduce by 30% per decade) result in physical functioning dropping below the threshold where activities of daily living become difficult and then impossible to carry out \(^{35}\). When strength, muscle power, flexibility and co-ordination, and balance decline, functional capacity is compromised; the older person may be less able to prevent a slip, trip or stumble becoming a fall. After a fall, many older people find getting off the floor impossible, leading to a long lie.

It is possible for many to regain this lost functional ability relatively quickly. Regular, appropriate physical activity and specific, tailored exercise directly improves functional activity and activities of daily living. In people aged 74 and over, a 20% increase in muscle strength was achieved in 8 weeks \(^{36}\).

**Fracture**

Osteoporosis contributes to the occurrence of many fractures. Osteoporosis is defined as a ‘progressive systemic skeletal disease characterised by low bone mass and microarchitectural deterioration of bone tissue, with a consequent increase in bone fragility and susceptibility to fracture’ \(^{37}\). The prevalence of osteoporosis in the UK stands at approximately three million people.

The clinical significance of osteoporosis lies in the fractures that arise. In the UK, osteoporosis results in over 200,000 fractures each year, causing severe pain and disability to individual sufferers at an annual cost to the National Health Service (NHS) of £1.7 billion \(^{38}\) \(^{39}\). More than one-third of adult women will sustain one or more osteoporotic fractures in their lifetime. Lifetime risk in men is less but still substantial and approximately half that in women \(^{40}\).

Common fractures include vertebral compression fractures and fractures of the distal radius and the proximal femur. Hip fractures alone account for more than 20% of orthopaedic bed occupancy in the UK, and the majority of the direct health service cost of osteoporosis \(^{40}\).

The ageing of the UK population will give rise to a doubling of the number of osteoporotic fractures over the next 50 years if changes are not made in present...
practice. Although bone mineral density (BMD) is an important determinant of fracture risk, many other factors, including liability to falls and types of fall, also contribute to the risk. The aetiology of osteoporotic fractures is therefore multifactorial and strategies to tackle osteoporosis need to take these factors into account.

Prospective studies have shown that the risk of fracture increases progressively with decreasing BMD. Systematic review of observational studies with the use of absorptiometric techniques indicates that the risk of fracture increases approximately twofold for each standard deviation increase in BMD. The predictive value of BMD for fracture is at least as good as that of blood pressure for stroke\textsuperscript{41}. Bone mass in later life depends on the peak achieved at skeletal maturity and subsequent age-related bone loss. Twin studies suggest a strong genetic effect on bone density and important environmental influences include hormonal status, exposure to steroid therapy, physical activity and dietary calcium intake.

Approaches to the prevention and treatment of osteoporosis include population-based strategies and those targeted at high-risk individuals. Possible measures to reduce fracture risk in the general population include increasing the level of physical activity undertaken at all ages, reducing the prevalence of smoking and increasing dietary calcium and vitamin D intake. Epidemiological studies have shown, with varying degrees of certainty, that these risk factors are associated with osteoporosis, but there is little evidence about their effects on fracture risk from randomised controlled trials. There was no clear evidence that population-wide screening using any modality (risk factors, biochemical markers of bone turnover, or bone densitometry) was effective in reducing fracture incidence. For these reasons, the priority for prevention should be selective case finding\textsuperscript{42}. 
1.3 Road traffic accidents

The Patterns of occurrence of road traffic accidents

Age and sex

Accidents to people aged 60 years and over (who form 20.5 percent of the total population of Britain) show:

- a below-average involvement as casualties of all severities, most of which have only slight injuries;
- a greater proportion of casualties killed or seriously injured (KSI); and
- an above average risk of being killed in a traffic accident (Table 3).

The same pattern applies for people aged 80 years and over (who form an estimated 4.6 percent of the population). Situations where elderly people are over-represented in road accident casualties are shown in bold in Table 1. Older people are over-represented in bus passenger accidents of all severities, and under-represented in fatalities as pedal cyclists.

Table 3. Representation of elderly people as road accident casualties 1998

<table>
<thead>
<tr>
<th>Severity</th>
<th>All road users</th>
<th>Pedestrians</th>
<th>Bus passengers</th>
<th>Pedal cyclists</th>
<th>Car drivers</th>
<th>Car passengers</th>
</tr>
</thead>
<tbody>
<tr>
<td>People aged 60+ (20.5 percent of the population)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Killed</td>
<td>25.4</td>
<td>46.6</td>
<td>52.9</td>
<td>19.6</td>
<td>20.6</td>
<td>24.4</td>
</tr>
<tr>
<td>KSI</td>
<td>14.1</td>
<td>21.8</td>
<td>50.3</td>
<td>7.8</td>
<td>13.8</td>
<td>15.3</td>
</tr>
<tr>
<td>All severities</td>
<td>9.8</td>
<td>14.6</td>
<td>33.8</td>
<td>5.0</td>
<td>8.8</td>
<td>10.4</td>
</tr>
<tr>
<td>People aged 80+ (4.6 percent of the population)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Killed</td>
<td>8.2</td>
<td>19.0</td>
<td>23.5</td>
<td>1.3</td>
<td>5.6</td>
<td>6.2</td>
</tr>
<tr>
<td>KSI</td>
<td>3.3</td>
<td>7.1</td>
<td>16.0</td>
<td>0.6</td>
<td>2.5</td>
<td>3.1</td>
</tr>
<tr>
<td>All severities</td>
<td>1.6</td>
<td>4.1</td>
<td>6.7</td>
<td>0.5</td>
<td>1.1</td>
<td>1.6</td>
</tr>
</tbody>
</table>

Sources: Road Accidents Great Britain, 1998, Table 29a
Population Trends 98, Winter 1999, Table 1.5

Elderly people are less likely than the rest of the population to be involved in a road accident that causes them to suffer a slight injury. They are, however, more likely than the rest of the population to be killed by a road accident, particularly as a pedestrian or bus passenger.
Table 4 shows the number of fatal casualties for different categories of road user in different age bands. From the age of 50, the number of pedestrian fatalities increases with increasing age. For ages 60 - 69, there are more pedestrian than car driver fatalities, and for ages 70 - 79, more pedestrian fatalities than all car occupants. For ages over 80 years, 61 percent of all traffic fatalities are pedestrians.

Table 4. Numbers of fatal casualties, 1998

<table>
<thead>
<tr>
<th>Age group</th>
<th>20 - 29</th>
<th>30 - 39</th>
<th>40 - 49</th>
<th>50 - 59</th>
<th>60 - 69</th>
<th>70 - 79</th>
<th>80 +</th>
<th>All 60 +</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pedestrians</td>
<td>122</td>
<td>77</td>
<td>67</td>
<td>73</td>
<td>100</td>
<td>150</td>
<td>172</td>
<td>422</td>
</tr>
<tr>
<td>Car drivers</td>
<td>295</td>
<td>197</td>
<td>148</td>
<td>124</td>
<td>86</td>
<td>85</td>
<td>63</td>
<td>234</td>
</tr>
<tr>
<td>Car passengers</td>
<td>118</td>
<td>39</td>
<td>33</td>
<td>47</td>
<td>39</td>
<td>63</td>
<td>35</td>
<td>137</td>
</tr>
<tr>
<td>All car users</td>
<td>413</td>
<td>236</td>
<td>181</td>
<td>171</td>
<td>125</td>
<td>148</td>
<td>98</td>
<td>371</td>
</tr>
<tr>
<td>Bus passengers</td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>4</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>All road users</td>
<td>747</td>
<td>552</td>
<td>354</td>
<td>334</td>
<td>270</td>
<td>320</td>
<td>280</td>
<td>870</td>
</tr>
</tbody>
</table>

Source: Road Accidents Great Britain, 1998, Table 29a

Type of road user injured

Among people aged 65 and over, land transport accidents were responsible for 13% of deaths from accidents in 1999 and 3% of serious accidental injuries resulting in 4 or more days stay in hospital in 1999/2000. In 1999, 859 people aged 60 and over died on the roads of Great Britain, and 5,038 were seriously injured. Despite an increase in the number of people aged 60 and over, the number of older road users killed in 1999 fell 41% from a baseline of the 1981-85 average, serious injuries fell 41%, and total casualties fell 6.5%. Casualties in the over 80s have increased 47% which is a reflection of the 59% increase in this population over that period.

Table 5 shows the number of casualties of all severities, mainly slight injuries, for different categories of road user in different age bands, and is the best indication available of the relative number of accidents, other than minor “damage-only” incidents. The pattern is quite different to that for fatalities. Up to the age of 80, car drivers outnumber pedestrian casualties. It is worth noting the way that car driver casualties reduce steadily with increasing age. Drivers aged 60 and over represent only 8.8 percent of all car driver casualties; those over 70 years, who make up 11.5 percent of the population, only 4 percent.
Table 5. Numbers of casualties, all severities, 1998

<table>
<thead>
<tr>
<th>Age group</th>
<th>20 - 29</th>
<th>30 - 39</th>
<th>40 - 49</th>
<th>50 - 59</th>
<th>60 - 69</th>
<th>70 - 79</th>
<th>80 +</th>
<th>All 60 +</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pedestrians</td>
<td>5855</td>
<td>4412</td>
<td>2995</td>
<td>2508</td>
<td>2190</td>
<td>2514</td>
<td>1850</td>
<td>6554</td>
</tr>
<tr>
<td>Car drivers</td>
<td>41368</td>
<td>33565</td>
<td>20444</td>
<td>13445</td>
<td>6488</td>
<td>4014</td>
<td>1423</td>
<td>11925</td>
</tr>
<tr>
<td>Car passengers</td>
<td>16896</td>
<td>9389</td>
<td>5920</td>
<td>5302</td>
<td>3850</td>
<td>2808</td>
<td>1180</td>
<td>7838</td>
</tr>
<tr>
<td>All car users</td>
<td>58264</td>
<td>42954</td>
<td>26364</td>
<td>18747</td>
<td>10338</td>
<td>6822</td>
<td>2603</td>
<td>19763</td>
</tr>
<tr>
<td>Bus passengers</td>
<td>704</td>
<td>772</td>
<td>741</td>
<td>820</td>
<td>1205</td>
<td>1212</td>
<td>602</td>
<td>3019</td>
</tr>
</tbody>
</table>

Source: Road Accidents Great Britain, 1998, Table 29a

Figure 13 reinforces the above statistics. Amongst older people aged 65 and over involved in motor vehicle traffic accidents, 42% of those who died were occupants of vehicles and 52% were pedestrians. Amongst the people aged 65 and over seriously injured in motor vehicle traffic accidents (resulting in 4 or more days stay in hospital), 51% were vehicle occupants, and 37% pedestrians.

The results given in this section show that the dominant road accident issues for older people are:

i. Despite under-involvement of older people in traffic accidents that cause slight casualties, older people are more likely than other age groups to be killed in traffic accidents; and

ii. The category of older road user most likely to be killed is pedestrians. From the age of 70, pedestrian fatalities out-number car occupant (driver and passenger) fatalities.
Figure 13: Type of road user injured in motor vehicle traffic accidents resulting in death or hospital admission for serious injury amongst people aged 65 and over in England (Source: ONS 1999, HES 1999/2000)

**Motor vehicle traffic accidents: deaths by road user killed, ages 65 and over**

- Vehicle occupant: 42%
- Pedestrian: 52%
- Pedal cyclist: 3%
- Other: 3%

**Motor vehicle traffic accidents: serious injury by road user injured, ages 65 and over**

- Vehicle occupant: 51%
- Pedestrian: 37%
- Pedal cyclist: 3%
- Other: 9%
Occupants of motor vehicles

Injuries to vehicle occupants led to 5% of accidental injury deaths amongst people aged 65 and over. Older car drivers and passengers are at greater risk of serious injury and death than most other age groups.

The patterns of occurrence of accidental injury

Age and sex

Figure 14: Age-specific injury mortality and serious injury rates in England for occupants of motor vehicles (Source: ONS 1999, HES 1999/2000)
For occupants of motor vehicles, the accidental injury mortality rates and serious injury rates are U-shaped curves beyond the age of 14. Amongst men, the highest rates of serious injury and death occur in the 15 to 24 age group, reducing to their lowest level in the age groups 35-44, 45-54, 55-64 and 65-74. They then show an increase with increasing age. For women the patterns are similar, except that the highest rates are observed for women aged 75-84 and 85 and over, and the increase in rates with increasing age appears to start approximately 10 years earlier for women than for men. In almost all age groups, the rates of injury resulting in death or serious injury were higher for men than for women.

**Place of occurrence**

There have been many studies of the pattern of accidents for older drivers. Hakamies-Blomqvist\(^{45}\) provides a summary of typical accidents for older drivers. Older drivers are less likely than younger drivers to have single-vehicle accidents and accidents in which excessive speed is a causative factor, and they are less likely to have drunk alcohol before driving. They are over-represented in accidents at intersections and in complex traffic situations; their fault is likely to have been to fail to yield right-of-way or to respond to a traffic sign or signal. Most accidents to older drivers happen in daylight\(^{45}\).

**Nature of injury**

The majority of accidental injury deaths to older vehicle occupants are as a result of internal injury to the chest, abdomen and pelvis (Table A7, Appendix 2). Other principal causes of death to older occupants of vehicles include head injury (skull fracture and intracranial injury), fractures to the spine and trunk, and fracture to the lower limbs. The principal diagnosis of admissions for serious injury amongst older vehicle occupants were chest injuries and injuries to the leg (Table A8, Appendix 2). The other body area affected in a substantial number of serious injuries was the head and neck.
Pedestrians

Pedestrian injuries led to 7% of accidental injury deaths in people aged 65 and over.

The patterns of occurrence of injury

Age and sex

Figure 15: Age-specific injury mortality and serious injury rates in England for pedestrians injured in motor vehicle traffic accidents (Source: ONS 1999, HES 1999/2000)

For older pedestrians, the patterns of rates of occurrence differed for the two outcomes shown in figure 15, namely deaths and serious injury resulting in 4 or more days stay in hospital. The highest rates of injury death for both men and women were in the oldest
age group, ie. aged 85 and over. The rates of injury death increased with age beyond age 64. For serious injury, the highest rates were again in the oldest age group, but the pattern of rates of serious injury were U-shaped from age 5 upwards. For both men and women, the lowest rates of serious accidental injury occurred for ages 25-34, 35-44, and 45-54, with both male and female rates increasing beyond age 54. In almost all age groups, the rates of pedestrian injury resulting in death or serious injury were higher for men than for women.

**Place of occurrence**

Pedestrians aged over 60 are more likely than younger people to be injured on a pedestrian crossing, and less likely to be injured while walking on a footway or verge (Table 31, DETR, 199943). Over 90% of pedestrian casualties are sustained whilst crossing the street. Older people have particular problems crossing roads with 4 or more lanes. Factors that increase the risk of accidental injury amongst pedestrians include traffic speed, crossing design, and the judgement and road experience of the older person.

**Nature of injury**

The majority of accidental injury deaths to older pedestrians are as a result of internal injury to the chest, abdomen and pelvis (Table A9, Appendix 2). Other principal causes of death to older pedestrians include head injury (skull fracture and intracranial injury), fractures to the spine and trunk, and fracture to the lower limbs. The majority of diagnoses of admissions for serious injury amongst older pedestrians were injuries to the leg (Table A10, Appendix 2). The other body area affected in a substantial number of serious injuries was the head.
Other Road users

Bus passengers

A study of accidents to bus passengers was made in 1976. Although now very old, it provides the best picture available of the types of accidents that injure bus passengers. Table 6 shows that for both older and younger passengers, accidents in which the bus was involved in a collision, or manoeuvred violently to avoid a collision, caused a minority of casualties. Sixty nine percent of the non-collision accidents to people aged over 60 involved falls within the bus.

Table 6.  Age and accident type for bus passengers

<table>
<thead>
<tr>
<th></th>
<th>Estimated age</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Under 60 years</td>
</tr>
<tr>
<td>Collision casualties</td>
<td>276 (25%)</td>
</tr>
<tr>
<td>Non-collision casualties</td>
<td>842 (75%)</td>
</tr>
<tr>
<td>All casualties</td>
<td>1118 (100%)</td>
</tr>
</tbody>
</table>

Source: Leyland Vehicles Ltd, 1980

Casualties in collisions are distributed between older and younger passengers approximately in proportion to their numbers among the bus passengers. Older passengers are greatly over-represented among non-collision casualties, in that 43 percent of the casualties come from about 27 percent of the passengers.

Final remarks

When the topic of road safety and elderly people is raised, a common reaction is that the issue concerns car drivers becoming less safe as they get older, and that the policy challenges are how to identify less safe older drivers and stop them driving. When the statistics for road accident casualties among older travellers are examined, however, this reaction is found to be very far from the whole story. While older travelers have fewer slight accidents than younger travellers, a disproportionate number of older travellers are killed in road accidents. This is almost certainly due to the relative frailty of older people, and the greater likelihood of serious injury in the event of an accident. This applies to pedestrians, car occupants and bus passengers. Over a quarter of all traffic fatalities are people aged 60 and over.
1.4 Fires

Size of the problem

Among people aged 65 and over there were 219 deaths and over 3,000 casualties in the UK in 1999 as a result of fire (Source: DTLR). The majority of these were accidental fires in dwellings. Fire/burns were responsible for 3% of accidental injury deaths in 1999 and 1% of serious accidental injury to older people in 1999/2000. The rate of death and injury increases with age, with those aged 80 and over at substantially greater risk. The British Crime Survey (2000) indicates that older people are less likely to have fires but are much more likely to be killed or injured if they do. Survey data tend to show that there are more fires where people live on lower incomes, or in rented accommodation.
The patterns of occurrence of fires

**Age and sex**

Figure 16: Age-specific injury mortality and serious injury rates in England as a result of fire (Source: ONS 1999, HES 1999/2000)

The rates of occurrence of deaths and serious injury as a result of fire increase with age beyond age 64 for both men and women. For almost all age groups, the rates for men exceed substantially those for women.

**Place of occurrence**

Figure 17 shows the place of occurrence of fires resulting in death during the period 1997-99, for males and females and separately for ages 65-74 and 75+. These show that the vast majority of fire deaths occur in the home, with an additional small percentage in institutional settings.
Figure 17: Accidental injury deaths by place of occurrence, England 1997-99 pooled (Source: ONS).

(a) Males, aged 65-74.

(b) Females, aged 65-74

(c) Males, aged 75 and over

(d) Females, aged 75 and over
Nature of injury

Tables A11 and A12 (Appendix 2) indicate that similar proportions of fire related deaths and serious injury are caused by burns and by smoke inhalation.

Causes and risk factors

**Figure 18: Non-fatal casualties in accidental dwelling fires, people aged 65 and over in the UK, by source of ignition (Source: Home Office, 1999)**

Major causes of fire death amongst older people were smoking (56 deaths) heating (n=36), and cooking (n=30). Electric blanket fires led to 11 deaths among people aged 65 and over in 1999, accounting for almost half of all deaths from electrical fires in this age group (n=26). Leading causes of injury were cooking, smoking, electrical appliance fires and heating. Findings from the British Crime Survey in 2000 suggest that 60% of domestic fires are cooking related, with heating fires and electrical fires making up a further 10% each.

Almost all (82%) of the fatal injuries resulting from clothing fires occurred in people aged 60 and over and many of these were over 70. Loose fitting or flowing garments, especially dresses, skirts and nightdresses, are most frequently mentioned in clothing related fires resulting in serious or fatal injury. The most common materials involved were cotton, nylon and cotton-polyester mix. Wool and denim were rarely involved. It
has been suggested that the reasons for the increased rates of serious and fatal injuries amongst older people resulting from clothing fires are the following:\footnote{47}:

- They are less aware that their clothing has caught alight;
- They often lack the capabilities to extinguish the fire;
- They are often alone and so no one is at hand to help put out the fire;
- The impact of burns is far more serious for an older person.

Across all ages, there were 474 electric blanket fires attended by the Fire Brigade in 1999 resulting in 12 deaths and 200 injuries. In people aged 65 and over there were 11 deaths and just over 100 injuries. Older people aged 65 and over have 6 times the national average rate of fatal injury and twice the national average for non-fatal injuries resulting from electric blanket fires\footnote{48}. Around 99\% of these fires are believed to involve blankets that are more than 10 years old.

The following factors have been found to put an older person at particular risk of burns: physical disabilities, psychiatric illness, impaired vision and smell, alcohol use, medicine use, and smoking\footnote{49}. Extrinsic risk factors for burns include flammable garments and flammable furniture, the absence of smoke alarms, gas cookers for cooking, as well as older people living in poverty and / or in rural areas.

Fire-related case-fatality rates are highest in older people. Factors affecting this death rate were age, burn extent and depth, smoke inhalation, predisposing factors, early medical management, and the development of complications after admission\footnote{50}\footnote{51}. The case fatality rate is higher for people living in rural rather than urban areas, and delay in management is partly responsible for this\footnote{50}. For non-fatal injury, factors affecting length of stay in hospital include extent of the burn, pre-existing medical conditions, and the development of complications after admission\footnote{51}. The mean length of stay for burn injuries in England amongst people aged 65 and over was 15 days in the 1999/2000 financial year.
1.5 Targets

Targets relevant to older people include the following.

Department of Health: Accidental injury was one of four priority areas in the health strategy. The accidental injury targets were to reduce by the year 2010:
- death rates from accidents by at least a fifth
- the rate of serious injury from accidents by at least one tenth

DTLR – National road strategy: By 2010 the Government want to achieve:
- a 40% reduction in the number of people killed or seriously injured in road accidents
- a 10% reduction in the slight casualty rate, expressed as the number of people slightly injured per 100 million vehicle miles.

DTLR: Residential home fire safety targets include:
- Reducing the incidence of accidental fire-related deaths in the home by 20% averaged over the five-year period to March 2004 compared with the average recorded in the five-year period to March 1999.
- Reducing the number of building fires in England and Wales by 10% by March 2004 from the 1998/1999 baseline.

HSE: The Health and Safety Commission strategic statement included targets for health and safety. Those most relevant for accidental injury are – by 2010 to achieve:
- a 30% reduction in the number of working days lost per 100,000 workers from work related injury and ill health
- a 10% reduction in the incidence rate of fatal and major injury accidents

Within the National Service Framework for Older People, the following standards have been included to reduce the number of falls that result in serious injury and ensure effective treatment and rehabilitation of those who have fallen.
- The NHS working in partnership with councils, take action to prevent falls and reduce resultant fractures or other injuries in their population of older people.
- Older people who have fallen receive effective treatment and rehabilitation and, with their carers, receive advice on prevention through a specialised falls service.

Milestones to achieve these standards are as follows:
- Local health care providers (health, social services and the independent sector) should have audited their procedures and put in place risk management procedures to reduce risk of older people falling (April 2003).
- The HImP and other relevant local plans developed with local authority and independent sector partners, should include the development of an integrated falls service (April 2004).
- All local health and social care systems should have established this service (April 2005).
2. Priorities for prevention

Based on the ‘What Works’ document\textsuperscript{4}, the Working Group developed a table to aid priority setting. The completed table, shown in Appendix 1, was used only to inform discussion.

The table includes the following gradings:
- the strength of evidence;
- the likely impact on the total burden of injury for older people;
- its likely contribution to a reduction in inequalities;
- the relative cost of the intervention;
- its implementability.

Evidence relating to effectiveness was much stronger than for any of the other criteria within the table. As well as an aid to priority setting, the table was useful for highlighting gaps in evidence.

The table is presented in cause groups. From the Working Group’s consideration of the entries under each, the research evidence has been synthesised to produce a recommended approach to prevention. In some instances, the Working Group has been able to refer to guidelines produced through systematic review. In others, the evidence base has been interpreted by the Working Group to produce a recommended intervention programme.

Falls, RTAs and domestic fires have been identified as priorities for prevention. They are not only important causes of accidental injury amongst older people, but are also important causes within other age groups. In some instances, the preventive solution will be unique to older people, but for others the solution will be applicable across all ages.
2.1 Falls & Fractures

To prevent accidental injury and their sequelae amongst older people, potential strategies for prevention include:

- Reduce the risk of falls occurrence;
- Strengthen the older person’s bones, so that if a fall does occur the risk of fracture is reduced;
- Reduce the energy of impact;
- Improve coping strategies following a fall.

The first of these leads to a consideration of the prevention of falls amongst older people, and the second to the prevention and treatment of osteoporosis. The third leads to consideration of the use of hip protectors and other strategies that reduce the transfer of kinetic energy to the body, in particular the skeleton, and the fourth to appropriate training and rehabilitation. Each of these will be considered in turn.

The strategic approach to falls and fracture prevention is in three stages:

- Identification of at-risk groups of older people
- Detailed assessment of older people within these groups to identify whether they are at increased risk of falling or fracturing
- Facilitate intervention to address the risk factors identified.

Falls

Current situation

At the local level, currently falls prevention ranges from no provision to the provision of selected services. These include:

- assessment and follow-up of older people who have fallen and attended A&E or general practice and primary care services to prevent future falls;
- discharge planning aimed at reducing the risk of future falls;
- incorporation of falls risk assessment into the over 75 health check in general practice with follow-up for people at increased risk;
- targeted exercise programmes provided for people at risk of future falls;
- home safety checks and ‘handyperson’ schemes aimed at repairing or making improvements to the home environment.
- promotion campaigns (eg. the DTI’s ‘Slip. Trips and Broken Hips’ campaign) that provide information and advice to health practitioners and guidance on best practice.

Links to National Strategies and Programmes

The Government’s health strategy identified accidental injury prevention as a priority. The NHS Plan recognises older people as a priority group. One of the most important causes of morbidity and mortality is falling, and so this has been, and will remain, a major focus. The recent National Service Framework for Older People (NSF-OP) sets a standard for assessment and effective treatment aimed at falls and fracture reduction. A
medicine management standard for older people is also included. The National Institute for Clinical Excellence is to develop a clinical guideline for the assessment and prevention of falls in older people. The Government has convened an Interdepartmental Working Group on Physical Activity for Older People, to help progress policy in this area. The DTLR’s recent consultation on ‘Housing, Health and Safety Rating System’ proposes a health and safety rating system aimed at preventing accidental injuries at home by tackling unfit housing.

Proven and promising interventions

The literature on what works has been summarised in a number of reviews and includes multiple risk factor assessment and intervention, exercise, and medication review. Based on published evidence of what is effective, DH funded guidelines for the prevention of falls and falls injury were developed. Also, a trans-Atlantic collaboration resulted in the production of clinical practice guidelines (AGS/BGS guidelines). These guidelines are, on the whole, consistent with each other. They include a recommended approach to prevention (multifaceted assessment and intervention amongst at-risk groups of older people) which is in broad agreement with that presented in the NSF-OP, which the Working Group supports. This includes measures for both primary and secondary prevention.

An important part of any intervention appears to be exercise aimed at modifying risk factors for falling. When strength, muscle power, flexibility, co-ordination, and balance decline, functional capacity is compromised; the older person may be less able to prevent a slip, trip or stumble becoming a fall. A DH funded training package has been developed that can equip local practitioners with the relevant knowledge and skills to prevent falls through exercise. The modification of a number of these risk factors involves referral to a physiotherapist or occupational therapist. Guidelines for the rehabilitative management of older people who have fallen have been produced for these professionals.

Strategies

The strategic approach to falls and falls injury prevention is presented in three stages:

- Identification of at-risk groups of older people (eg. people who have fallen and sought medical help, people living in institutions).
- Detailed assessment of older people within these groups to identify whether they are at increased risk of falling or injury. The guidelines recommend that assessment include review of medication, postural hypotension; vision; walking/gait; balance; and environmental factors.
- Facilitate intervention to address the risk factors identified. This could include direct intervention by the person making the assessment, but is more likely to involve referral to the appropriate professional.
Identification of at-risk groups

In the absence of evidence to promote a population screening approach, a strategy that focuses on groups who are at high risk of falls and osteoporotic fracture seems most suitable. A number of criteria could be used but the following are likely to be effective in identifying the highest risk groups:

- Recent fall with injury (which is an independent predictor of future falls)
- Recurrent falls over the past year
- People experiencing gait / balance problems
- People living in institutions, including care homes
- Recent low trauma fracture (which is an independent predictor of future fractures)
- Diagnosis of osteoporosis / low bone density (which is a strong predictor of future fractures)

A lower limit for age of 70 years is proposed, since the risk of falling increases with age and most falls risk assessment tools and interventions have been trialed in people over this age.

The above criteria for the identification of people in at-risk groups are very clear. A recent fall and / or osteoporotic fracture are identifiable by staff in healthcare and non-healthcare settings, and these should stimulate referral to an intervention programme. Additionally, a recent fall or fracture, as well as the results of bone densitometry, may increase patient awareness and willingness to participate in an assessment and intervention programme.
Detailed assessment of high risk individuals

An assessment for falls risk has been published in the DH sponsored *Guidelines for the prevention of falls in older people*¹, which was reproduced in the recent publication ‘Falls Fragility and Fractures’⁵⁶. The assessment tool has been derived from sound randomised controlled trials that have shown a reduction in the risk of falling or falls injury. It has not been formally validated – no assessment tool that encompasses this range of risk factors has. However, it is being used increasingly for the assessment of falls risk. The risk factors addressed by the assessment include the following:

<table>
<thead>
<tr>
<th>Risk factor</th>
<th>Feder et al guidelines¹</th>
<th>AGS/BGS guidelines³</th>
</tr>
</thead>
<tbody>
<tr>
<td>History of falling</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Medication review</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Alcohol use</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Postural hypotension</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Cardiovascular</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vision</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Hearing</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Walking / gait</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Transfers: toilet, bath, etc.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Balance</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Neurological</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Environmental</td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

Feder and colleagues are currently revising their assessment tool to take account of evidence from both prospective cohort studies and RCTs. It will be submitted for publication in 2002. Also shown are the risk factors that the AGS/BGS guidelines recommend be assessed³. Local health organisations and social services are developing single assessments and falls assessment could be included as part of these.

It is recommended that, should a positive response be found in regard to any of the above risk factors, that the appropriate management strategy be implemented. This could include direct intervention by the person making the assessment, if qualified, but would more likely involve referral to the appropriate professional. Direct evidence of the effectiveness of falls prevention intervention exists for the assessment and management of falls risk for people identified in the following ways:

- Attendance at A&E for a fall
- Living at home but with one or more risk factors for falls, including a fall in the last year
- Living in the community aged 80 and over
- Living at home and currently taking psychotropic medicines
- Living in a nursing home (US) and who has recently fallen

The AGS/BGS guidelines include an algorithm that summarises the assessment and management of falls, and this is reproduced here (Figure 19).
Figure 19 Algorithm summarising the assessment and management of falls

Periodic case finding in Primary Care:
Ask all patients about falls in past year

No Falls

No intervention

Recurrent Falls

Gait/ balance problems

Check for gait/balance problems

No problem

Single Fall

Fall Evaluation

Patient presents to medical facility after a fall

Assessment
History
Medication
Vision
Gait and balance
Lower limb joints
Neurological
Cardiovascular

Multifactorial intervention (as appropriate)
Gait, balance and exercise programmes
Medication modulation
Postural hypotension treatment
Environmental hazard modification
Cardiovascular disorder treatment
A number of the risk factors identified using the fall risk assessment tool can be modified using exercise interventions. Exercise results in a number of favourable responses, and contributes to healthy ageing. The evidence has shown that some exercise programmes have been successful in preventing falls and falls injury. However, exercise may not necessarily be effective in modifying falls risk. A number of exercise interventions evaluated using trials have not been effective in preventing falls in older people for one or more of the following reasons:
- they used exercise of insufficient duration;
- inappropriate intensity;
- insufficient frequency;
- not specific for falls or falls injury prevention;
- did not target people at risk of falling.

To be successful at falls and falls injury prevention, the exercise must be specific for purpose and progressive. Its effect differs according to the type of exercise, the exercise programme and the target group of adults. No national guidelines have been produced which give detailed advice on exercise for falls prevention for use with older people, although recently Skelton and Dinan have reviewed the literature and have gone some way to address this and produced a framework for falls and falls injury prevention. Subsequently, the Department of Health funded these authors and others (including the HEA) to develop a training package that can equip local practitioners to prevent falls through exercise. The personal and professional skills of the instructor / exercise practitioner (or the person administering the programme) may be one of the most important aspects of the intervention. A training course for professionals working in the field of falls and fracture prevention has also been developed by these authors in collaboration with others, funded by the Department of Health. Action is needed to ensure its delivery at a local level.

The modification of a number of these risk factors involves referral to a physiotherapist or occupational therapist. Guidelines for the collaborative, rehabilitative management of older people who have fallen have been produced that are specifically aimed at those professionals who receive referrals of older people who have recently fallen. The guidelines comprise two parts: assessment and treatment. They recommend that the assessment by the rehabilitation team should identify:
- impairments;
- environmental hazards;
- what coping strategies have been adopted following the fall;
- the psychological consequences of the fall;
- baseline characteristics against which the effect of the interventions can be judged;
- the extent to which the older person can co-operate with the proposed interventions;
- signs and symptoms that need to be brought to the attention of their doctor.

The guidelines recommend that on the basis of the assessment, interventions be agreed with the older person to address the following:
- to increase the older person's stability during standing, transferring, and walking through balance, strength, and flexibility exercises, as well as through the use of walking aids;
- with the older person's consent, removing, replacing or modifying environmental hazards;
teaching the older person to get up off the ground following a fall (which is often a problem for the older faller), to summon help, and to move about and keep warm whilst on the floor; and

- to encourage the person to cope with increasing threats to their balance and with increasingly difficult functional tasks.

Osteoporosis and fractures

Most fractures amongst older people are as a result of a fall, with a smaller number the result of pedestrian or other road traffic accident. Prevention of falls and RTAs are considered in other subsections. In simple terms, given an injury event occurs, a fracture can be prevented by strengthening bones (or reducing the amount of bone loss), or by reducing the amount of energy transferred to the bone. The first leads to strategies aimed at osteoporosis prevention and treatment, and the second to methods of protection.

Links to National Strategies and Programmes

The recent NSF-OP sets a standard for assessment and effective treatment aimed at falls and fracture reduction. Following the publication of the 1999 RCP guidelines, the National Osteoporosis Society produced a strategy document for osteoporosis for implementation by Primary Care Groups and Trusts (ie. Primary Care Organisations - PCOs). Updated guidelines for PCOs were published by the National Osteoporosis Society in the summer.

Proven and promising interventions

Bone mineral density, liability to fall and types of fall contribute to the risk of fracture. Epidemiological studies have shown, with varying degrees of certainty, that physical activity undertaken at all ages, smoking cessation and appropriate dietary calcium intake are associated with a reduced risk of developing osteoporosis. To prevent fracture injury and death amongst older people, potential strategies for prevention include reducing the risk of falls occurrence (see previous section), strengthening the older person’s bones, and reducing the energy of impact.

The Royal College of Physicians in 1999 published clinical guidelines for the prevention and treatment of osteoporosis. The purpose of these guidelines was not to produce a working document for clinical practice, but to produce a framework from which local management protocols could be developed. Since their publication, some important randomised controlled trials (RCTs) have been published. The guidelines were updated in 2000 to take account of this new trial evidence. Additionally, an algorithm was produced, based on a distillation of the evidence-base, for the management of individual patients.
Hip protectors have been shown to reduce hip fracture risk by over 50% \(^{60}\). Hip protectors are specially designed clothing which divert/absorb the force of an impact on the hip. Reduced compliance can limit their potential efficacy. Increased compliance can be achieved if additional support is given when the older person is starting to wear them \(^{61}\) as well as promotion of hip protectors to carers (including care staff) and adequate training in their use and benefits \(^{62}\).

**Strategies**

Approaches to the prevention and treatment of osteoporosis include population-based strategies and those targeted to people at the highest risk. There is little evidence about the effects of population-based screening on fracture risk from controlled trials, and no clear evidence of a reduction in fracture incidence. For these reasons, the recommended priority for prevention has been selective case finding.

The proposed strategic approach to falls and fracture prevention is presented in three stages:

- Identification of high risk groups of older people (e.g., repeat fallers, housebound older people, previous fragility fracture, people with known risk factors for osteoporosis)
- Measurement of bone mineral density, as well as detailed assessment of older people within these groups to identify whether they are at increased risk of falling.
- Treatment with supplements, lifestyle advice or treatment with drugs as required. Facilitate intervention to address the risk factors identified.
- Consideration of hip protectors for at-risk older people in institutional settings.

**Assessment**

Measurement of bone mineral density (BMD) predicts future fracture as reliably as blood pressure predicts stroke and significantly better than serum cholesterol predicts myocardial infarction \(^{41}\). Like blood pressure measurement, BMD measurements have high specificity (that is the number of false positives is low) but relatively low sensitivity (that is the number of false negatives is high). The sensitivity is approximately 50% therefore half of all osteoporotic fractures will occur in women said not to have osteoporosis. It is because of this that BMD measurements are most helpful in a selective case finding strategy where the need for the test is dependent on clinical risk factors. In this way the sensitivity of the test to predict fracture is increased \(^{58}\).

Measurement of BMD should be performed if an individual has an osteoporotic fracture, or fulfills other criteria for bone densitometry, listed in the National Osteoporosis Society guidelines for primary care \(^{40}\). Local availability is likely to determine the measurement technique used although it is recognised that dual-energy X-ray absorptiometry (DXA) is most appropriate. There is currently patchy provision of DXA scanning across the
Adequate provision across the country is recommended. BMD thresholds for intervention have been published and these should be interpreted with the guidance of a local clinician who has expertise in densitometry and osteoporosis.

Treatment of low bone density

The RCP guidelines update 42 provides an algorithm for the management of low bone density in men and women over the age of 45 years. The algorithm has been distilled for the management of individual patients based on the evidence-based synthesis of the different interventions (Figure 20).

Reducing the energy of falls impact

In addition to reducing falls and improving bone strength, a further approach to fracture prevention is to reduce the impact force on the skeleton using external body shielding. This really only applies to the hip where hip protectors have been shown to reduce hip fracture risk by over 50% 60. The initial studies were carried out in nursing home residents, although one study involving community-dwelling older people has been published and other community-based studies are ongoing.

The main disadvantage of hip protectors are that they only work whilst they are worn and, because they can be uncomfortable, reduced compliance can limit their potential efficacy. Promotion to make older people aware of the prevalence, causes and consequences of hip fracture might motivate the older person to wear hip protectors despite the extra effort required and the discomfort caused by the protector. Increased compliance in the use of hip protectors can be achieved if additional support is given when the older person is starting to wear them. Parkkari and colleagues believe that the attitude of the staff in the institution was a crucial factor for reaching good compliance in their study 62. This suggests that promotion of hip protectors to carers (including care staff), as well as adequate training in their use and benefits, may be one of the key factors to increase compliance.
Figure 20. Medical management of men and women aged over 45 years who are or are at risk of osteoporosis 42.

Major risk factors
[other than previous fragility fracture include the following:
1. Untreated hypogonadism
   [premature menopause, sec. amenorrhoea, prim. hypogonadism in
   women; prim. or sec. hypogonadism in men]
2. Glucocorticoids [7.5mg per day prednisolone for 6 months or more]#
3. Disease associated with increased prevalence of osteoporosis (eg.
gastrointestinal disease, chronic liver
disease, hyperparathyroidism,
hyperthyroidism)
4. Radiological osteopenia.

Other risk factors in national and international guidelines include family
history, low body weight, cigarette
smoking, height loss, or low bone
mass as assessed by other
techniques.

Lifestyle advice
• Adequate nutrition, especially with
calcium and vitamin D
• Regular weight bearing exercise
• Avoidance of tobacco use and
alcohol abuse.

Previous fragility fracture
Defined as a fracture from
standing height or less and
includes prevalent vertebral
deformity. A previous fragility
fracture is a strong independent risk factor for
further fracture and may be
regarded as an indication for
treatment without the need to
BMD measurement when the
clinical history is unequivocal.

Investigations
• FBC, ESR
• Bone and liver function tests
  [Ca, P, alk phos, albumin,
AST/gammaGT]
• Serum creatinine
• Serum TSH
If indicated
• Lateral thoracic and lumbar
  spine X-rays
• Serum paraproteins and
  urine Bence Jones protein
• Isotope bone scan
• Serum FSH if hormonal
  status unclear [women]
• Serum testosterone, LH and
  SHBG [men]

For men aged less than 65 years, specialist referral should be considered
*Recommended daily dose 0.5-1 g and 800IU respectively
#Refer to previously published guidelines.
**Treatments listed in alphabetical order. Vitamin D and calcium are generally regarded as
adjuncts to treatment. HRT: oestrogen in women, testosterone in hypogonadal men
BMD: bone mineral density
DXA: dual energy x-ray absorptiometry
HRT: hormone replacement therapy
2.2 Road Traffic Accidents

Policy Issues

Perhaps the most important effect of ageing for older travellers is the increase in fragility that occurs at ages beyond about 40 years. This means that for older people, a given accident is more likely to cause injury, recovery from a given injury will take longer and a given injury is more likely to cause death. A person aged 80+ is about six times as likely to die in a given accident as someone aged 40. This leads to the over-representation of older people in traffic fatalities, despite their lower than average risk of accident involvement. It also leads to the misperception that older drivers are more dangerous than middle-aged drivers, which is not supported by statistical accident data. Because the medical causes of death in road accidents vary with the age of the casualty, it is possible that occupant and road user protection systems do not serve older people as well as younger people. This needs to be investigated, and improvements made where they are needed.

Mobility is essential for independent living and contributes to older people remaining healthy and avoiding isolation and depression. The balance between the benefits of mobility and the risk of travelling, increased by the fragility of older age, should be a matter for individual older people. Driving, and resumption of driving, should be a rehabilitation aim for older people.

In Britain, more elderly people are killed as pedestrians than as car occupants. Almost half of all pedestrian fatalities are from the 20 percent of the population aged 60 years and over. There is a need to improve the safety of all pedestrians, and particularly of elderly pedestrians.

There is no evidence that older drivers are any greater threat to other road users than are middle-aged drivers, but they are at greater risk themselves because of their fragility. Some older drivers with various diseases, such as early dementia, are at increased risk of accident. If they can be detected, they may be helped by retraining and by counseling on alternative ways to remain mobile and live independent lives. Techniques for assessing drivers are still far from reliable.

Older drivers, except for some of those in the early stages of dementia, avoid driving situations that are stressful and dangerous. All drivers reduce the number of journeys and distance driven as they age. There is a need for improved mobility alternatives to the car to help older drivers avoid driving in difficult conditions (darkness, congestion, unfamiliar areas, bad weather, motorways), and to substitute for the car when the driver decides to stop driving.

Policies on older drivers should distinguish between the risks to themselves that result from increasing fragility in old age, and any increased threat that they may pose to other road users. The former is arguably a matter for informed decision by the older driver; the latter undoubtedly a matter for public concern and policy. Any policy must be based on the real situation and not on public perceptions, some of which are probably mistaken.
Age based screening programmes for elderly drivers cannot be justified on experience to date. They may well frighten some people, particularly elderly women, into stopping driving unnecessarily early. If these people then satisfy their mobility requirements by walking, this will increase the total road accident fatalities, because walking is more dangerous per journey than is driving. It is about 50 percent more dangerous for older people to make a journey on foot than to make a journey by car (the journeys being of the lengths appropriate to the different modes and the age of the traveler). Any policies that cause older people to travel on foot instead of by car will increase the total number of road accident fatalities. There are indications that this has happened in Finland, in contrast to Sweden.

**Practical Measures**

**Older pedestrians**

Many road safety interventions are not confined to one age group but bring benefits to the whole community. Initiatives such as traffic calming and pedestrianised areas can reduce the casualty rates for all age groups. However, certain groups (e.g. children, people with a physical disability or mobility impairment, and older people), are clearly at more risk from traffic than other groups, due to their reduced mobility or increased frailty. Consequently, the effect on casualty figures of these schemes is likely to be greater for these groups than for others, but at no additional cost.

**Proven and promising interventions**

Around 90% of injuries to older pedestrian are sustained whilst crossing the street. Risk factors include traffic speed, availability of crossings, crossing design, and the judgement and road experience of the older person. There are a number of interventions that benefit the older pedestrian, as well as the disabled person, and these include: traffic calming; pedestrian areas; pedestrian crossings which are designed to meet the needs of slower walkers / wheelchair users; and stippled stones at crossings to alert the visually impaired, clearly visible and audible signals at road crossings.

The key issue for older pedestrians is the amount of time available to cross the road. Since highway, road and street pedestrian facilities are generally based on young adult performance levels, many older people have difficulty walking at the 1.2 m/sec assumed by most traffic engineering manuals. Moreover, engineers are often reluctant to introduce an across-the-board increase in signal times because of the likely disruptions to traffic flow 64.

Technology now allows the green signal to match the time required by pedestrians to cross the road by tracking pedestrian movements through infrared detectors or other devices. This type of crossing, known as a "PUFFIN" crossing (Pedestrian User Friendly INtelligent), was first introduced in the U.K. where early work indicated that the crossings were likely to be safe and well accepted by the public 65. A more recent evaluation
showed that all pedestrians, regardless of age, took longer to cross the road, suggesting a less stressful interaction with traffic. Older people showed a greater increase in crossing time, indicating that they derived the greatest benefit.

The Transport Research Laboratory (TRL) estimates that the introduction of 20 mph zones reduce pedestrian casualties (all ages) by 43%, and traffic safety schemes reduce pedestrian casualties by 25%. Additionally, TRL have estimated a potential 50% casualty reduction through improved pedestrian facilities including priority walking routes, improved crossing facilities – located where pedestrians need them, and timings attuned to the needs of pedestrians. Further evidence of the value of such interventions is provided by the Gloucester Safe City project. In 1996 DETR funded a £5 million 5 year project to try out a strategic approach to safety in an average sized local authority. The project aims to cut casualties by a third by treating the city as a whole, not just tackling accident sites. Accidents to walkers and cyclists do not tend to ‘cluster’ in identifiable hotspots, so the approach brings benefits to all road users. The results have been very promising: in the areas so far treated casualties (across all ages) are down by 60%.

Older car occupants

Safety improvements to the design of vehicles can have beneficial effects on both primary safety (reducing the number of accidents) and secondary safety (reducing injuries once an accident has happened). Improvements to primary safety (brakes, tyres, steering and lighting) will no doubt continue to be made and will be of benefit to drivers of all ages. This section focuses on aspects of vehicle design that could be of particular benefit to the older driver. It should be noted that very little research has been carried out to quantify the cost benefits to older drivers associated with each of these measures. A common point regarding all of the safety improvements considered below is that vehicle manufacturers should make more efforts to consider the specific needs of older users in their designs.

Vehicle improvements

- A recent OECD report suggests that the design elements of a car which often encumber older drivers and passengers are the doorframe height, width of door aperture, seat height, door sill height and floor-well depth. Studies conducted in England and Sweden in the 1980’s recommended improvements to vehicle design dimensions to improve older peoples’ vehicle ingress and egress. Recent model cars appear closer to providing relative ease of access to older persons than cars of the late 1980s, when these research studies were conducted.

An assortment of optional, after-market car features has been developed particularly for disabled people. Many of these can also reduce the effort required by an older occupant to enter or exit a vehicle. These include:

- Swivel seats that can turn sideways to 90° and slide and swivel out of the doorframe.
Additional steps may assist in entering and exiting vehicles with a high doorsill. Alternatively, a high seat cushion can be added to some vehicles after-sale; 

Severely impaired drivers or passengers requiring wheeled mobility aids may require a powered hoist to help stow the mobility aid in the trunk or on the rooftop. These are expensive items of equipment, but may be necessary to maintain an older person’s mobility.

Other areas of in-vehicle design which require specific attention to cater for the needs of older users include:

a) Seat belts
The widespread use of seat belts is one of the major contributors to the reduction in road accident fatalities. However, whilst seat belt design has improved, there is some concern that current designs are not sensitive to the needs of older people, and do not take into consideration their increased frailty and restriction of movement. Portable grips may help the occupant reach the seat belt (which may be positioned far behind the seat occupant in two-door cars) or the door catch. Seat belts, as with most products, have traditionally been designed with a younger, ‘standard’ human in mind. In the event of an accident, seat belts designed in this way have been shown to employ more force than is tolerable by some older users, with the result that they may suffer rib fractures and other chest injuries. ‘Intelligent’ restraints are now being developed incorporating ‘controlled flexibility’, which will sense when a more fragile person is in the seat, and adjust their restraining characteristics accordingly. Seat belts in the back seats of cars are also notoriously difficult for older people to fasten, with the result that they do not fasten their seat belt. Designers are now starting to look at ways to improve the design of rear seat belts to make them easier for older people to use.

b) Air bags
In the event of an accident occurring air bags can reduce the severity of injuries by spreading the load of an impact with the steering wheel or windscreen, thus reducing the resulting trauma. However, as with seat belts, airbags tend to be designed to protect younger users and concerns have been expressed regarding the force with which airbags are deployed. While the speed and force of deployment are tolerable by younger users, older drivers may suffer severe injury due to their increased frailty. Intelligent systems are in development that identify the type of occupant and their seating position, and adjust the force of deployment accordingly.

c) Side Impact Protection Systems
Research has highlighted the difficulties that older drivers experience when making right hand turns across traffic. The consequence is that older drivers are more likely to be involved in side impact crashes. With this in mind, the widespread introduction of an improved side impact protection system, including air bags, could be of particular value to older drivers.

d) Power assisted steering
With increasing age we lose muscle tone and strength. Power assisted steering can help drivers of all ages to control their vehicle more efficiently and safely. Older drivers in particular can benefit from such improvements, especially when making low speed manoeuvres, and when parking.
e) In-vehicle telematics

Over the past 20 years there has been considerable interest in the potential of in-vehicle telematics to reduce the difficulty of aspects of the driving task and improve road safety. Systems have been developed (and are now starting to be introduced into top-of-the-range vehicles) which offer the potential to improve road safety. Systems such as night vision, collision avoidance and adaptive cruise control all promise to reduce casualties. However, these benefits need to be weighed against the increased distraction and workload that may accompany the introduction into the vehicle of these technologies.

Infrastructure improvements

The ageing process may include the development of functional impairments that cause driving difficulties. The OECD report “Mobility Needs and Safety Problems of an Ageing Society” summarises infrastructure improvements and modifications that would assist older drivers. These include:

- Use of one-way systems, prohibiting dangerous turns, separating traffic flows and staggering the decision processes through use of roundabouts or offsetting crossroads;
- Dedicated turn-across-traffic lanes and traffic signals allowing protected turns;
- Improved road geometry at intersections.
- Better sign luminance to counteract loss in legibility distance;
- Improved conditions for night driving, especially by increasing the reflectivity of roadway delineation and adequate maintenance of the reflectivity of signage and other road markings;
- Larger sign symbols (with symbols preferred to text);
- More relevant, conspicuous, and timely information about required driving manoeuvres, complemented by multiple signage for advanced warning;
- Regular maintenance of signage to prevent redundancy and to eliminate clutter;
- Speed reduction through road design or traffic controls where complex manoeuvres are required;
- Longer sight distances to allow for older drivers’ slower response times; and
- Appropriate placement of signs and signals both laterally and vertically. This is critical, given peripheral vision reduction and particularly with regard to height above eye level.

Advice for older drivers

Maycock in 1997 suggests a range of advice to drivers: the need for regular eyesight tests, the particular problems of alcohol and of tiredness for the older person, the dangers of some medications, and planning for the time when they would need to give up driving. Many of these issues are covered in leaflets which have been produced by DETR and by other road safety organisations and older person’s organisations (e.g. Help the Aged, SAGA).

There is increasing recognition that some medications commonly prescribed to older people (e.g. benzodiazepines, tricyclic antidepressants, opiates) have the unwanted side effect of making the user drowsy during the daytime. A recent DETR survey into the
incidence of drugs and alcohol in road accident fatalities showed that 17.5% of those aged 60+ who were killed in road traffic accidents had benzodiazepines, opiates or tricyclic antidepressants in their bodies at the time of the accident. One in five pedestrian fatalities aged 60 or over had traces of opiates, benzodiazepines, or a combination of the two in their system. More surprisingly, traces of illicit drugs were found in a further 7% of road users aged 60 and over.

Additionally, the Forum of Mobility Centres provides advice for older drivers, which aims to help older and disabled people achieve independent mobility as drivers, passengers and wheelchair users. Funded from a variety of different sources, they are usually staffed by physiotherapists or occupational therapists and driving instructors. Services typically include:

- A free information service for disabled and older people, their families and professionals, covering vehicle choice, control options and advice on learning, continuing or returning to driving;
- Assessment and advice on vehicle ingress and egress, advice on the selection and use of wheelchairs, and car adaptations to accommodate both drivers and passengers with disabilities;
- Re-training for experienced drivers who have mobility problems and training for other professions (including physicians and driving instructors) in driver assessment;
- Continuous evaluation of the service and long term follow-up research to monitor the outcomes of assessment and training.

Clients can refer themselves to these centres or may be referred by their doctor, therapist or social worker.

**All road users**

National Initiatives

Although the government’s road safety strategy *Tomorrow’s roads: safer for everyone* does not focus on the older driver and older pedestrians specifically, the measures it is introducing are expected to improve the road environment for all users. The key elements are to: achieve driving speeds appropriate to conditions; make safety the main objective of improvements in the road infrastructure; reduce drink- and drug-driving; improve vehicle safety; and improve training and testing. The government’s main strategy to help pedestrians is aimed at making drivers become more aware of their responsibilities towards all vulnerable road users via better training and testing. They have also produced guidance for local authorities on the sort of strategies they should consider (see later).

Speed: The government will develop a national framework for determining appropriate vehicle speeds on roads, ensuring that measures are in place to achieve these, and to research a number of speed management problems to gain sufficient information to develop further effective policies. They propose to develop a new hierarchy of roads...
defined by their function and quality, which they hope will facilitate the introduction of new speed restrictions. They are also encouraging more local authorities to use their increased powers to introduce 20mph zones and more restrictive speed limits in residential areas, where appropriate. There will also be a focus on improving compliance with speed limits.

Road infrastructure: The government will ensure that safety is a main objective in designing, building, operating, and maintaining roads, as well as publishing guidance about engineering for safer roads based on sound research, as well as using local transport plans to promote safer neighbourhoods.

Drink- and drug-driving: The strategy focuses on the reduction of drink- and drug-driving. This will be through targeted breath testing, increased publicity, increased penalties, rehabilitation, and possibly lower drink-drive limits. In regard to drug-driving, the emphasis is mainly on the effect of illicit drugs whilst driving, rather than medicinal products. However, medicines that affect the central nervous system, including those that cause drowsiness, are a hazard when driving. The use of a prominent symbol on the labels of medicines known to affect driving have been considered by the European Pharmaceutical Committee, who concluded that they are in favour of introducing a harmonised symbol. The government is considering its promotion in this country.

Vehicle safety: The government is also determined to further address vehicle safety by encouraging improvements which: prevent accidents happening; protect car occupants in the event of an accident; and which protect other road users. They will also help consumers choose safer vehicles, encourage better standards of vehicle maintenance; and better quality control by manufacturers.

Training and testing: The strategy also focuses on training and testing and aims to instill in young people the right attitudes towards road safety and safe driving. Some of the proposed activities aim to: raise the standard of tuition offered by driving instructors; improve the driving test; and enhance the status of advanced motoring qualifications.

Other strategic approaches the government could take include introducing policies that lead, for the whole population, to:

- more attractive public transport
- a net reduction in car journeys in urban areas
- an increase in the proportion of total journeys made on public transport through, for example, pricing structure to encourage greater use.

Local Initiatives

Local Authorities: Government guidance, aimed at Local Authorities, to make roads safer for pedestrians includes the following interventions: well-planned pedestrian routes, pedestrianisation of town centre shopping areas; adequate lighting; well-designed and positioned crossings; improved signal-controlled junctions; and traffic calming to reduce vehicle speeds in key areas. The government also encourages the development of ‘home zones’, where research-based engineering solutions and local transport plans are used to reduce speeds, promote safer roads and safer neighbourhoods.
Local authorities should use their increased powers to introduce 20mph zones and more restrictive speed limits in residential areas, where appropriate.

They should ensure that road safety is accorded prominence in planning processes of local authorities and work together with other agencies towards jointly identified objectives and priorities. They should recognise as a priority the prevention of accidental injuries to the older road user and implement methods of prevention of accidental injury pertinent to older road users, including those described earlier in this section.

They should ensure that more extensive use of engineering techniques are used to produce speed reductions in residential areas where there are a significant number of older people. They should ensure that new housing is appropriately sited in relation to roads and amenities, that provision is made for pedestrians, and that new developments are designed and constructed to minimise exposure to hazardous roads.

When older people are no longer able to drive, they become more dependent on public transport. Local Authorities should implement traffic management schemes, which include the provision of adequate public transport, suitable for older people. Substantial concessions should be made available to the older person to encourage this.

Police forces: The police are obviously key in enforcing legislation. They have a particular focus on improving compliance with maximum speed limits, as well as curbing drink- and drug-driving. Additionally, in liaison with local authorities, they should consider the introduction, or expansion, of driver improvement schemes for driver offenders.

Health Authorities / Primary Care Groups: They should work with other agencies to facilitate interventions targeting risk factors for accidental injury to older pedestrians and older drivers relating to health, disease and functional capacity.

Conclusions

Recent evidence suggests that older people who develop age-related health problems are more likely to experience difficulties walking and using public transport before experiencing difficulties with driving. Developing useable alternative options to the car represents a major challenge to transport planners and others.

Older drivers tend to be safer than is commonly believed. A major reason for older people’s over-representation in some casualty data is their increased frailty and heightened vulnerability to injury if involved in a road accident, be it as a driver, a passenger, a pedestrian or a bicyclist. Older drivers do not pose a particular threat to other road users. The available evidence indicates that in serious crashes, older drivers are more likely to be killed or injured than others are. Those over 75 years of age are three times more likely to die than 20 year-olds and those over 80 are up to six times more likely to die. Older drivers have different types of accident to younger drivers, often involving collisions at intersections and failure to yield right-of-way. A slightly higher proportion of accidents to older than younger pedestrians are on a pedestrian crossing. Older bus passengers are most likely to be injured in accidents that do not involve collisions or violent manoeuvres. Their injury is most likely to be caused by a fall within the bus.
For older people, road accident fatalities are primarily pedestrians. For everyone aged 60 and over, 49 percent of all fatalities are pedestrians, and outnumber car occupants, who are 43 percent of all fatalities. For people aged 80 and over, 61 percent of all fatalities are pedestrians. To reduce the total number of fatal casualties, at least as much attention must be given to pedestrians as to car drivers.

Road system and vehicle standards based on the abilities of a fit, young person are inappropriate for an ageing society, and need to be adapted accordingly.

Infrastructure improvements designed to reduce road traffic accident casualties amongst all road users are likely to have a particularly beneficial impact on reducing accidents involving older road users, at no additional cost. There is a need for local government and industry to support improvements to roads and vehicles to make them safer and easier for older people to use, whether as car drivers or passengers, pedestrians, users of public transport or other road users. This will entail changes both to the physical infrastructure (including vehicle design) and to regulatory and administrative policies, and include promotion of the use of new safety technology for vehicle use by older persons.

There is increasing awareness of the extent to which medications commonly prescribed to older people may impact on their road safety. Demographic changes mean that GPs cannot assume that their older patients do not drive. In prescribing medicines they should ask the question and, if appropriate, consider prescribing an alternative medicine less likely to cause daytime impairment.
2.3 Residential fires

Evidence of effectiveness

Evidence of what works is summarised in Appendix 1 and includes the following. Observational study evidence indicates that a reduction in smoking prevalence would reduce fire injury and deaths. The use of smoke detectors reduces fire injuries and death. There is evidence from the USA that a community (all age) smoke alarm give-away programme can achieve reductions in house fires. Evidence from a community (all age) study in Camden suggests that give-away programmes alone are ineffective and require back up through installation. There is observational study (weak) evidence that the replacement of electric blankets that are over 10 years old would prevent many electric blanket fires.

National Strategies and Programmes

Reports by the Audit Commission in 1995 and the Community Fire Safety Task Force in 1997 both recommended a shift of the primary focus of the fire service from fire fighting to fire prevention. The Task Force proposed that the following statement of purpose should drive national and local efforts in the fire service:

“To provide a service to the community which will result in the elimination of preventable fires, fatalities and casualties”.

In April 1998, The Government announced its intentions to accept the main recommendations of the Community Fire Safety Task Force, one of which was the establishment of a National Community Fire Safety Centre (NCFSC). The NCFSC was established in September 1998, and its principal aim is to develop a coordinated and sustained national strategy for delivering fire safety awareness and education. Working with the fire service, its representative organisations and the wider fire industry, the NCFSC is involved in a programme of action that includes:

• developing and evaluating a programme of national fire safety publicity campaigns to meet specific domestic fire risks and trends;
• providing a toolbox of community fire safety programmes and resources which can be used by brigades;
• establishing partnerships and networks with national and community-based organisations, agencies and other government departments, particularly targeting the hard-to-influence groups.

National fire safety publicity campaigns. Increasingly, the NCFSC will be working closely with brigades to combine national campaigns with more targeted activity, corresponding to the management of fire risk. The next major campaign on smoke alarms in December 2001 / January 2002 will specifically target older people, and will include joint initiatives with community organisations such as Help the Aged. Implementation of campaigns and promotional activity will be carried forward through the CACFOA Community Fire Safety Task Group, the Centre’s new user group, which is in direct contact with the brigades themselves.
Toolbox. The Community Fire Safety Toolbox was launched in November 2000. It contains practical guidance and examples of best practice on the implementation and evaluation of community fire safety initiatives. The Toolbox module focussing on older people provides guidance on developing partnerships with other organisations and schemes (such as the DTLR’s Home Energy Efficiency Scheme), and best practice in the form of the ‘Caring with Carers’ scheme developed by Merseyside Fire Brigade. The Toolbox is a ‘living’ document that will be updated periodically – future plans include developing a Toolbox website, enabling all updates to be provided online.

Partnerships and networks. At the national level, the NCFSC has developed links with a wide variety of government departments and agencies, as well as other organisations such as RoSPA, CAPT and Help the Aged. A prime example of cross-government working is the recent joint DTI/HO publication on candle safety.74

Further national developments

Efforts at national and local level should reinforce and complement each other, for example in outreach to older people and ethnic minority communities, and in new and evolving local strategic partnerships. The next two years should see significant progress in fire service involvement with these key elements in the Government’s strategy for neighbourhood renewal.

Last year, HM Fire Service Inspectorate carried out a thematic review to establish the progress made by brigades in shifting their focus to fire prevention, and made 36 recommendations for future development aimed at both the Home Office and brigades.75 A central element of the latest thematic review is to assist brigades to come to terms with their new responsibility to interact with the community and promote fire safety work.76 The 1999 thematic review on equality in the fire service highlighted the challenge of community fire safety in helping the fire service to recognise diversity and build on the opportunities to engage with minority ethnic communities.77 The implementation of the recommendations made in the reports of these reviews will enable the fire service to adapt to its new fire prevention role.

The Government also plans to bring forward legislation at the earliest opportunity to make community fire safety and education work a statutory duty of the fire service, in line with the recommendation of the Community Fire Safety Task Group.

Local strategies

The Government initiative has resulted in the establishment of Community Fire Safety Units at brigade level, involving a large number of dedicated professionals with a range of experience and disciplinary backgrounds. All brigades now produce a strategic, data-driven Community Fire Safety Plan as part of the refocusing of the service. These plans

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1 The DTLR are running the Home Energy Efficiency Scheme (HEES) to improve dwellings that experience fuel poverty. This will be particularly beneficial to older people on low incomes or receiving benefits. It will seek to ensure that people have adequate heating provision. Where this is not the case, the scheme will update heating systems. Given the number of fires amongst older people whose source is heating appliances, this is likely to have a direct affect on prevention. This is also an opportunity for the provision and installation of smoke alarms with 10 year batteries.
outline clearly a programme of prevention activities. The main focus is accidental dwelling fires; the home is where most casualties occur (Home Office Letter 1998).

Local councils and others provide grants for older people’s homes that can be used to improve safety in the home through, for example, electrical rewiring and replacement of heating systems and boilers.
3. Implementation

In some cases, successful delivery of an intervention is not age-specific. Consequently, it is likely to be possible to extrapolate from successful methods of implementation relating to other age groups / all ages to older people. Below are some of the themes discussed by the working group.

What elements make for successful implementation?

The Working Group discussed the need for the following reviews so that sound statements can be made:

- Systematic review of the evidence on community-wide interventions shown to influence falls, RTA accidents and residential fires affecting older people.
- Systematic review of the evidence on community-wide interventions, applicable, to any age group, to identify key themes of what works.
- Systematic identification of the key message that can be identified for the prevention of accidents amongst older people from the literature on (a) getting research-into-practice, (b) changing professional behaviour.

How should accident prevention amongst older people be implemented?

The working group identified some gaps that could be addressed:
- evidence indicating what makes for successful intervention
- accident injury prevention in older people with dementia
- medicines review – implementation issues
- more emphasis on assessment and modification of the physical environment
- more of an emphasis on primary prevention
- interventions that could take place before people reach older age

They also considered the need for a trained workforce to deliver accident prevention. Susie Dinan, from the Working Group, prepared a synopsis of training courses for exercise, which also included the generic national injury prevention training programme (see Appendix 3).

The working group were alerted to the strategy for primary care for the implementation of osteoporosis guidelines, published in 2001 by the National Osteoporosis Society 40.

Delivery structures

A table of ‘who should do what’ to prevent accidental injuries amongst older people is included as Appendix 4

National policy / local strategy initiatives that can facilitate intervention include:
Saving Lives: Our Healthier Nation, The NHS Plan, the inequalities agenda, the National Service Framework for Older People, Health Improvement and Modernisation Plans, Healthy Cities, Single Regeneration Budget steering groups.

Charities and voluntary agencies (RoSPA, Age Concern, Help the Aged, etc.) have an important role to play in the delivery of effective interventions.

The requirement for sound statistical information and the identification of reliable and valid indicators for monitoring links to the work of the AITF Measuring and Monitoring Injuries Working Group.

**Short, medium and long-term actions**

Short, medium and long term actions are included in the Accidental Injury Task Force report to the Chief Medical Officer. Additionally to this, the working group considered a number of options for further research (Appendix 5).
Acknowledgement

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References