# A literature review of factors which cause and mitigate against injury in the home

**Commissioned by Scottish Community Safety Network**

**Dr Margaret Callaghan 24th June 2021**

## 1. Introduction

Every week there are 6000 deaths in the UK as a result of accidents in or around the home as well as 2.7 million people a year requiring a hospital visit.[1] A UK government report published in 2018 stated that accidents at home are a leading cause of preventable death for children under five years and are a major cause of ill health and serious disability.[2] Children living in the most deprived areas are most at risk and there is a 38% greater risk of hospital admissions for a preventable injury.[2] Older people are also at an increased risk of injury and death; and falls are the major reason of hospitalisation for older people.[3]

Despite these figures, presently there is not a great deal of information known about what factors influence unintentional injuries and how these can be mitigated.

Scottish Community Safety Network (SCSN) commissioned a rapid literature review which aimed to explore and understand contributory factors to unintentional harm in the home and the initiatives that help to reduce them.

# 2. Methods

Search strategies were produced for each question

1. What factors contribute to injuries in the home?
2. What mitigates against such injuries?

A systematic search of the secondary literature was carried out between 15th and 25th March 2021 to identify systematic literature reviews, Health Technology Assessments (HTAs) and other primary research and case studies. The databases Assia, Barbour, ProQuest Public health, Medline and Cochrane were also searched for all study types.

Key websites were searched for guidelines, policy documents, clinical summaries, economic studies and ongoing trials. Websites of organisations related to this topic were also searched for example ROSPA, CAPT and harm and Injury Hub.

Concepts used in searches included: accidents, incidents, unintentional, injury and harm incident event in the home/house. The full search strategy is in in Appendix 1.

It was important that any evidence found could inform prevention of injuries in the home in the UK setting. Therefore papers were included which were in English, where findings had the potential to be transferable to the UK and where studies were of sufficient quality to ensure findings were valid.

Question 1 returned 76 abstracts of which 60 met the criteria for proceeding to full paper stage of these. The full papers were read for all 60 and of these 31 were relevant for inclusion in the review.

Question 2 returned 93 abstracts of which 68 were relevant for the proceeding to full paper stage. The full papers were read for all 68 and of these 44 were relevant for inclusion in the review.

This rapid literature review had to be carried out in a short time. Therefore it was not possible to include details of all 75 papers that met the full paper inclusion criteria.

It was established in the original proposal and by further discussion with SCSN that in this event only relevant systematic

reviews would be included as these have the best level of evidence. However for question 1 few systematic reviews were found. Therefore research was included which was the most recent, had the best evidence, included a range of groups and a range of accidents and was most relevant to the UK setting. For question two a larger number of systematic reviews were found. Therefore for this question only systematic reviews were included in the final nine.

The details of each source can be seen in the excel spreadsheet that accompanies this report. This spreadsheet allows reader to look at papers by country, population group or other relevant variable.

It is important to highlight that this report represents a rapid overview of the research that could be accomplished in the time available. It does not represent a comprehensive review of the evidence for contributory or mitigating factors. There are many other studies which contain useful information both on factors that lead to accidents in the home and factors that mitigate against such accidents. SCSN have a full list of all papers reviewed.

# 3. Results

## 3.1 Contributory Factors

Of the ten studies included in this section of the review, four of these explored falls,[4] [5], [6], [7] two accidents that resulted in hospital visits,[8],[9] one assessed homes for safety, [7, 10] one looked at piercing / cutting injuries [11], one at eye injuries [12] and the remaining one explored causes of fractures.[13]

Those at biggest risk of injury at home are the elderly and those under aged five. Of the ten studies included in this section of the review these included 3 of older adults (defined as over 75, over 85 and 65 to 92),[4, 10] [8] three of adults aged 20-64,[14] [6, 11] one of children attending hospital,[9] one of infants under aged 1,

[13] and the remaining two did not identify their population by age. [7, 12]

The remaining section will summarise the findings of these papers by accident.

### 3.1.1 Falls

Falls are one of the most common causes of injuries at home especially amongst the elderly and those who are frail. A Spanish cross-sectional study showed the importance of preventing falls.[4] Of 922 adults aged over 75 a quarter had a fall in the previous year and almost three-quarters had a previous fall. However the majority of these falls were not serious and the person had got back up within a few minutes. Comparing a group of people of dementia with those without who had a fall which resulted in a hospital visit, a large Danish study showed that those with dementia were twice at risk of a fall after controlling for other contributing factors[7] Other factor such as lighting, presence of an object, weather and season had no effect. This is a high quality study and strong evidence that dementia increases the likelihood of falls. A prospective Finnish study which aimed to determine which factors lead to falls in those over 85 found that poor eyesight, anti-psychotic medication and nervousness or fear all increased the risk of falls.[10] The authors concluded that interventions which minimised these factors would decrease the amount of falls and subsequent hospitalisation for this group. A New Zealand study of a younger age group demonstrated a correlation between falls at home which lead to a hospital visit or death and prescription medication. Use of two or more prescription medications in younger working people was associated with an increased risk of falls of 2.5.[6] As this is a correlation rather than a causal study it maybe that some other factor lead to the falls. Nonetheless it suggests that falls prevention support would be helpful for those on prescription medication especially lipid lowering or hypertension medication.

### 3.1.2 Home safety

A small study of 25 formerly homeless adults in the US showed that this group had the physical and mental functions of someone twenty years older and of significant health problems. However their housing placement did not take that into account and as a result did not asses their needs for safety. The authors recommend that such an assessment should take place for this vulnerable group and that this would have the potential to improve their lives and their safety.[5]

### 3.1.3 Socio-demographic factors

A large Danish epidemiological study which looked at hospital visits for childhood visits and compared with factors associated with social deprivation found that the children of those in a lower income bracket or with less education were far more likely to attend hospital because of an accident than those with a higher income or more education. Family structure has no effect on hospital attendance. As over fifty thousand people were included in the analyses this is a strong finding and suggests more support for those with more income deprivation.[9]

### 3.1.4 Penetrating Eye Injuries

A UK descriptive study which explored the prevalence and link between DIY and eye injuries and whether or not home and garden shops gave information on this showed that almost no information was given and those who had such injuries were not wearing safety goggles or taking other precautions. This is a small study but nonetheless it is likely that the encouragement of the purchase and wear of safety goggles and other safety measures would reduce the number of injuries from home and garden work. [12]

### 3.1.5 Piercing and cutting

A New Zealand study demonstrated that working age adults attending hospital with piercing or cutting injuries were significantly more likely to have been drinking alcohol before the injury and the risk increased as the amount of alcohol increased.[11]

### 3.1.6 Fractures in infants

A retrospective Austrian study of 248 infants which aimed to determine which infant fractures were preventable showed that in more than half of the cases skull fractures were diagnosed 67% of the accidents happened at home. [13] 37% (92) of these were from the changing table, arms of the caregiver, or out of bed. 2% (6) were victims of mistreatment. This suggests that advising caregivers about falls from changing tables or from their arms would help to substantially reduce such falls.

### 3.1.7 Other issues

A survey of older people attending the hospital in Genoa for any reason related to home accidents showed that people most commonly attended for bruising (39.6%), fractures (23.4%) and cuts (23.4%).[8]

## 3.2 Mitigating Factors

As well as looking at causes of injuries this review was also concerned with determining what evidence there was for factors that mitigated against such injuries. Ten reviews were chosen to explore a range of injuries, groups and mitigating factors. These reviews each contained many individual studies. The table below

summarises the aim of each review, the number of studies reviewed where this information is available, injury that it investigates, the population included, the results of the review and the quality of the evidence.

| Aim | Causal / Contributory Factor | Population | Number of studies / Sample size | Results | Title | Author |
|---|---|---|---|---|---|---|
| To determine whether home visits allowed elderly to stay at home rather than moving to residential care | Home visits | older people | 64 (28642) | High quality evidence of no effect on falls from interventions targeted to prevent falls. Low quality evidence of small significant effect on improved quality of life No effect on mortality No significant effect on reduction in institutional or hospital admission | Home Visits for Prevention of Impairment and Death in Older Adults: A Systematic Review | Grant, S. |
| Whether home visits lead to improved mortality and morbidity for frail elderly | Home visits to older people to prevent accidents | older people | 10 | No evidence of effectiveness, partly due to poor quality of studies, suggestion that multi-faceted approach has some positive outcomes for less elderly | Preventive home visits to older people | Swedish Council on Technology Assessment |

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| To determine whether assistive technology allowed people to live at home for longer | Assistive technology<br><br>Dementia<br>Measures of safety include care home admission; risky behaviours, accidents and falls at home; and numbers of deaths | older people | 3 (245) | No difference in care home admission<br>Probabity of a fall was 50% lower in intervention group<br>Some reduction in risky behaviour | Effectiveness of assistive technology in improving the safety of people with dementia: a systematic review and meta-analysis | Brims, L; Oliver, K |

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|---|---|---|---|---|---|---|
| To assess whether occupational therapy improves outcomes for those over 60 | Occupational Therapy | older people | 17 | Strong evidence is present for the efficacy of advising on assistive devices as part of a home hazards assessment on functional ability. Some evidence for the efficacy of training of skills combined with a home hazard assessment in decreasing the incidence of falls in elderly people at high risk of falling. Some evidence is available for the efficacy of comprehensive occupational therapy on functional ability, social participation, and quality of life. Insufficient evidence is present for the efficacy of counselling the primary caregiver of dementia patients about maintaining the patient's functional abilities. | Occupational therapy for community dwelling elderly people: a systematic review | Steultjens, Esther M. J. |

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|---|---|---|---|---|---|---|
| Home safety education prevented accidents in under 5 | Home safety education | under 5 | 3 | poor evidence base<br>no evidence that it worked | Does accident prevention education reduce the incidence of childhood accidents in the home? | Close, J. |

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|---|---|---|---|---|---|---|
| To assess whether home safety interventions lead to improved practice and whether there were differences with groups that were less advantaged. | Home safety education | families | 22 | The results often varied between studies but, overall, families who received home safety interventions were more likely to have a safe hot tap water temperature, a working smoke alarm, a fire escape plan, fitted stair gates, socket covers on unused sockets, syrup of ipecac, poison control centre numbers accessible, and to store medicines and cleaning products out of reach of children. The authors found that home safety education was equally effective in the families whose children were at greater risk of injury. | Parenting interventions for the prevention of unintentional injuries in childhood | Kendrick, D. et al. |

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|---|---|---|---|---|---|---|
| To evaluate the effectiveness of interventions aimed at preventing falls in people after stroke. | Preventing falls after strokes (70% of stroke survivors have a fall at home)<br>Secondary objectives 1) the number of fall-related fractures; 2) the number of fall-related hospital admissions; 3) near-fall events; 4) economic evaluation; 5) quality of life; and 6) adverse effects of the interventions. | stroke survivors | 14 (1358) | Exercise appears to reduce the rate of falls but not the number of people falling, but evidence low quality so no certainty, also potentially fewer falls by changing from multi to single focal spectacles, use of a rollator and home visits pre discharge to assess risk.<br>Generally falls studies not of good quality to draw conclusions to risk of falls and outcome of falls. | Interventions for preventing falls in people after stroke | Denissen, S. |

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|---|---|---|---|---|---|---|
| To determine whether occupational therapy could prevent falls | Evaluation of multi faceted before and after falls prevention strategy to see if occupational therapy could prevent falls | those at risk of falls | 78 | OT can reduce the impact of falls. | Determining the Effectiveness of a Falls Prevention Programme to Enhance Quality of Life: An Occupational Therapy Perspective | Atwal, A; Tolley, L |

Table 1

### 3.2.1 Older people

Several of the reviews looked at factors which supported older people. Two of these focused on preventing accidents that lead to admission to a care home. ([15, 16]). The first concluded that there was high quality evidence of no effect on falls from interventions targeted to prevent falls, low quality evidence of small significant effect on improved quality of life and no effect on mortality. Overall there was no significant effect on reduction in institutional or hospital admission.[15] The second stated that the evidence base was poor but that which did exist showed no effect of preventive interventions on reducing admission to a care home.[16] There was some effect of multi-faceted interventions had some effect on improved outcome for those who were less elderly. A review which looked at the effect of assistive technology on preventing admission to a care home for older people with dementia showed that whilst the technology lowered the occurrence of falls by half in one study, overall it did not lead to reduced admission to a care home.[17] However only three studies were available which met the inclusion criteria. A review which explored whether occupational therapy improved outcomes for those over 60 found strong evidence that advising on assistive devices as part of a home hazard assessment decreased the incidence of falls of those at high risk, some evidence that comprehensive occupational therapy improved functional ability, social participation, and quality of life. Insufficient evidence is present for the efficacy of counselling the primary caregiver of dementia patients about maintaining the patient's functional abilities.[18] This is supported by a study that showed that occupational therapy can reduce falls for those at risk. [19]

### 3.2.2 Stroke Survivors

A large review of 14 studies containing 1358 people evaluated the effects of interventions that prevented stroke survivors having falls at home. [20]Exercise appears to reduce the rate of falls but not the number of people falling but this is not certain because of the

low quality of evidence. Falls could also potentially be reduced by changing spectacle prescriptions to single focus, use of a rollator at home and home visits pre discharge to assess risk. For all of these better quality of evidence was required before this could be established.

### 3.2.3 Children and families

A large Cochrane review which included 22 studies explored aspects of home safety intervention to reduce accidents in children.[21] Overall these interventions were effective. Families who received home safety interventions were more likely to have a safe hot tap water temperature, a working smoke alarm, a fire escape plan, fitted stair gates, socket covers on unused sockets, syrup of ipecac, poison control centre numbers accessible, and to store medicines and cleaning products out of reach of children. The majority of the studies were of families from disadvantaged populations who were more at risk of adverse child health outcomes. The authors concluded that further research is required to explore mechanisms by which these interventions may reduce injury, the features of parenting interventions that are necessary or sufficient to reduce injury and the generalisability to different population groups.

A smaller review which explored home safety interventions to improve accidents in under 5s showed that there was a poor evidence base and no evidence that it worked.[22]

# 4. Discussion and Recommendations

It is difficult to draw conclusions from this review, one reason is the breadth of the review (including all population groups, all interventions and all outcomes). A second is the often low quality

of evidence in the research that is available. Overall more high quality specific research in this area is needed in order to provide a foundation for effective interventions.

However we do now have a full comprehensive literature search strategy available on which to base further work. A potential next step could be to do a full review of the all of the papers accessed. However this would be time consuming and resource intensive and may not return more useful evidence for practitioners though it would tell us where more research is needed.

A more useful step for practitioners would be to focus on the second question ‘what mitigates against such injuries’ and review the full literature.  Depending on resources and time such a review could be broken down further to focus on particular population groups depending on which was a priority (for example the frail elderly or young children).

From the present evidence there are some useful findings for practitioners:

It seems that there is little evidence that accident prevention intervention in older people’s homes decreases admission to care homes or hospitals even when it does decrease falls. This suggests that there is a need for more effective interventions to reduce admissions. ([15, 16]).

There was strong evidence that assistive technology helped prevent falls for people with dementia though it did not reduce

admission to a care home. [17]More widespread use of such technology is recommended for people with dementia.

It would also be useful to determine whether such technology would also reduce negative outcomes for older people generally or other vulnerable groups (such as stroke survivors) and if so to increase the provision of such technology more generally.

There is strong evidence that comprehensive occupational therapy improves outcomes for those over 60, and can reduce falls, improve functional ability, social participation and quality of life. [18]  [19].

Focusing on children and families, there is strong evidence from research which was largely carried out on disadvantage groups that home safety intervention reduces accidents in children.[21]. Families who received home safety interventions were more likely to have a safe hot tap water temperature, a working smoke alarm, a fire escape plan, fitted stair gates, socket covers on unused sockets, syrup of ipecac, poison control centre numbers accessible, and to store medicines and cleaning products out of reach of children. It is recommended that such interventions are more widespread in disadvantaged groups and that there is further research which looks at accident outcomes for these children and others after such interventions.

# References


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# Appendix 1 Search Strategy

| Checklist – Rapid reviews |
|---|

**Topic: accidents in the home risks and prevention initiatives**

**Key terms: accidents, incidents, unintentional, injury, harm incident event in the home/house**

Consider using PubReminer or MeSH on Demand to identify relevant terms for your topic.

Sure Info guidance on economic searching http://vortal.htai.org/?q=node/336

| Resources | Number of hits | Notes |
|---|---|---|
| | | |

| | | |
|---|---|---|
| **Scotland** | | |
| Scottish Government publications | 7 | |
| SHOW | 0 | |
| Healthcare Improvement Scotland | 0 | |
| Chief Scientist Office | 1 | |
| Aberdeen HSRU | 0 | |
| Public Health Scotland Data and Intelligence<br>[Look for information on incidence of condition as well as search topic more specifically] | Is this a link? | |
| ScotPho [As above] | 1 | |
| Health Facilities Scotland [Look for IRIC publications] | 0 | |
| **If applicable and agreed with HSR also search:** | | |

| | | |
|---|---|---|
| Public Health Scotland | 0 | |
| Health Protection Scotland [e.g. infectious disease] | 0 | |

| **Guidelines** | | |
|---|---|---|
| SIGN | N/A | |
| NICE [guidelines] | N/A | |
| Guidelines International Network | N/A | |
| NICE Evidence Search [use Guidance filter] | N/A | |

| | | |
|---|---|---|
| HTW | N/A | |
| HIQA | 0 | |
| Health Technology Assessment Group | 0 | Something for the public on avoiding alcohol related accidents |
| MSAC [Chronological order – most recent items are on last page] | 0 | |

| **Secondary evidence** | | |
|---|---|---|
| NICE guidance (technology appraisals, public health guidance, diagnostics guidance, interventional procedures, medical technologies, cancer service guidance) | N/A | |
| NICE MedTech Innovations Briefings | N/A | |
| NIHR Journals:<br>HTA<br>HSDR | N/A | |
| INAHTA | N/A | |

| | | |
|---|---|---|
| EVIDENT | N/A | / |
| AHRQ (**Monitor** for ECRI replacement) | 0 | Patient safety stuff |
| CADTH | N/A | |
| KCE (English language full text or summary) | 0 | |
| Cochrane Database of Systematic Reviews | 6 | |
| Database of Abstracts of Reviews of Effects (DARE) (CRD) | Too old | |
| PubMed Clinical Queries (Systematic Reviews section) | check medline | |
| NHS Evidence [Filters: commissioning guides, evidence summaries, HTA, systematic reviews] | N/a | |
| Epistemonikos | 3 | |

| | | |
|---|---|---|
| **Safety** | | |
| MHRA | 0 | |

| | | |
|---|---|---|
| **Economics** | | |
| NHS Economic Evaluation Database (NHS EED) via CRD | Not relevant | |
| MEDLINE (with SIGN & McMaster economics filters) ***Do this even if not looking for any other primary studies*** | Not relevant | |

| | | |
|---|---|---|
| **Bibliographic databases** (limit to systematic reviews first) | | |
| MEDLINE | 110 | |
| EMBASE | N/A | |
| CINAHL (or other topic related database e.g. PsycInfo) | N/A | |
| Web of Science | N/A | |

| | | |
|---|---|---|
| **SOCIAL CARE** (if required – see HSR) | | |
| **Does the question cover social care? See the social care checklist to select additional sources to search** | | |

| | | |
|---|---|---|
| **Ongoing Research** (if required – see HSR) | | |
| Current Controlled Trials (ISRCTN registry) | N/A | |
| Clinicaltrials.gov | N/A | |
| Medical Research Council Clinical Trials Unit | N/a | |

| | | |
|---|---|---|
| **Final checks** | | |
| Google | | |
| DynaMed [Check Reference section for anything missed] | **N/a** | |
| TRIP [Check for any guidelines, reviews missed] | **17** | |
| NICE Evidence Search [Evidence Uncertainties filter] | **N/a** | |

Comments and search issues:

| **Database search record** | | |
|---|---|---|
| **Database:**<br><br>e.g. OVIDSP/Medline | **Saved search strategy name** | **Search strategy** (inc. limits and filters) |
| Assia | | See below – 15/3/2021 English. No date limit) |
| Barbour | | 5 results – lot of stuff in here very old or unavailable |
| Proquest public health | | 34 results – may be similar to assia |