

**Finger-trapping:
a scoping study**

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Executive Summary

The Building Research Establishment (BRE) has been commissioned by the Scottish Building Standards Agency (SBSA) to undertake a research project as a scoping study on the issue of finger trapping. The SBSA had undertaken an initial review of the issue of finger trapping by looking at the statistics collected by the National Health Service (NHS). The initial review of the topic found evidence that there were ongoing initiatives to raise awareness and to tackle finger trapping incidents within the home.

The aim of the BRE research was to consider the guidance and precautions currently used by the domestic, public access, retail and education sectors to limit the incidents of finger trapping and whether or not these precautions might be relevant to dwellings.

The research has been undertaken through the following:

- Desk based review of currently available guidance. BRE has used relevant databases of literature and web based searches to consider the current guidance and trade literature that exists on finger trapping. There was little in the way of literature on finger trapping or papers on the type of equipment used. There was no evidence of a recognised standard other than in the area of powered doors and those for door closers. The guidance that was available was mainly produced by local authorities for the education sector.
- A survey of four sectors for existing practice and opinion, the retail, educational, public access and domestic sectors. Opinions have been sought from architects, builders, door suppliers, hardware suppliers, industry trade associations, owners and managers in each area. Users' opinions were obtained through phone call surveys using a set series of questions. There was little awareness of the issue amongst many of the sectors but the schools sector was being proactive in considering the issue. In the domestic sector there was little awareness amongst those surveyed, despite the statistics indicating that this is the area of greatest risk and frequency.
- The costs involved in purchasing the devices have been gathered for each sector. Differences occur not so much by the sector, but the type of equipment available for different types of doors.

The following conclusions are drawn from the investigation:

- Finger trapping in doors has been demonstrated as a cause of a relatively small percentage of common accidents amongst young children by the SBSA study. Also a small number of finger trapping incidents occurred among adults and the elderly.
- There is equipment available to prevent finger trapping injuries for various types of doors. The equipment is predominantly based upon the addition of plastic strips to doors on the hinged side. Door closers can also be used to minimise the risk of injury on both the hinged and lock sides of the door.
- The cost of the finger trapping devices is relatively low and is unlikely to exceed 10% of the cost of the door set. However, there is a need to consider the whole life costs and performance as the equipment may only have a lifetime of 10 years and therefore much less than the door leaf itself.

Finger trapping

- The impact of the fitting of safety equipment on fire and smoke performance needs further consideration. The absence of a recognised industry standard for finger trapping devices, particularly for manual doors, is a drawback for the compulsory fitting of such equipment in the different sectors.
- The surveys of industry undertaken were intended to give a picture of opinion in Scotland. There appeared to be only minimal awareness of the issue and the extent of problems caused by fingers being trapped in doors. The greatest level of awareness was observed in the schools sector, with a substantial number of products being used in nursery and primary schools.

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1 Introduction

The Building Research Establishment (BRE) has been commissioned by the Scottish Building Standards Agency (SBSA) to undertake a research project as a scoping study on the issue of finger trapping, see figure 1.

The SBSA had undertaken an initial review of the issue of finger trapping by looking at the statistics collected by the National Health Service (NHS), see appendix A for details. Information on childhood accidents is not monitored centrally; however NHS National Services Scotland (NHS NSS) does collect some information on childhood accidents using the Scottish Morbidity Record (SMR01). Finger trapping is not an injury that is recorded singly within data collected by the NHS and, for national coding purposes it is classed as an unintentional injury.

Unintentional injuries occur both at home and outside the home. Information for children focuses on four main age groups (under 1, 1-4, 5-9, and 10-14), where the type of injury reflects the child's state of development, changing perception of danger, types of activity and levels of responsibility. Most unintentional injuries do not result in hospital admission but are treated by GPs or as outpatients in Accident & Emergency departments, or by the child's parent or carer. However, Scottish Health Statistics report that unintentional injury is the most common cause for hospital admissions in children. The term "unintentional injury" is preferred to "accidents" as the latter implies events are inevitable and unavoidable whereas a high proportion of so-called accidents are now regarded as being preventable. Unintentional injuries can occur in any age group, but children and the elderly are more vulnerable.

The initial review of the topic found evidence that there were ongoing initiatives to raise awareness and to tackle finger trapping incidents within the home.

The aim of the research was to consider the guidance and precautions currently used by both the retail and education sectors to limit the incidents of finger trapping and whether or not these precautions might be relevant to dwellings. The findings will be used to inform a review of the Safety section of the Building Standards.

The BRE research has been undertaken through the following:

- Desk based review of currently available guidance. BRE has used relevant databases of literature and web based searches to consider the current guidance and trade literature that exists on finger trapping.
- A survey of four sectors for existing practice and opinion, the retail, educational, public access and domestic sectors. Opinion have been sought from architects, builders, door suppliers, hardware suppliers, industry trade associations, owners and managers in each area. Users' opinions were obtained through phone call surveys using a set series of questions.
- The costs involved in purchasing the devices have been gathered for each sector.
- The preparation of this output report

Figure 1: The young could easily inadvertently trap their fingers between a door and its frame



2 Review

The sectors and types of buildings of interest are as follows:

- Retail sector – shops and shopping centres.
- Education sector – nurseries, schools, colleges and universities.
- Public access sector – local and national government buildings, community halls, entertainment venues, sports facilities, places of worship, hotels and conference centres.
- Domestic sectors – houses, flats and residential care homes.

There is a range of types of doors used in such buildings, as follows:

- Single or double hinged doors (open one way)
- Single or double swing or pivot doors (open both ways)
- Single or double sliding doors
- Folding doors
- Revolving doors
- Automatic doors of various types.

2.1 Guidance

Incidents of finger-trapping usually involve infants, children and the elderly. In Scotland thousands of people are injured per year by trapping their fingers in doors many of whom require reconstructive surgery. The National Health Service estimates that each finger trapping incident they treat costs an average of £2500 to the NHS.

The most common areas for finger trapping accidents are as follows:

- Hinge cavity – A large exposed area within the hinge where fingers can be trapped. A door closing exerts a pressure of approximately 32,000 pounds per square inch (lbs psi).
- Hinge pin side – A small gap occurs here and there is a need to keep especially tiny fingers away from this area.
- Handle side – fingers can be trapped where the door meets the frame, e.g. if the door is closed too fast or if a wind or draught catches the door and slams it shut.
- Sliding or folding doors – fingers can be trapped where a sliding door edge meets the frame.

Guidelines include the practical design guidelines for commissioning architects and designers with respect to internal doors. This includes the following issues:

- Adequate safety glass viewing panel.
- Avoidance of opening or sliding/folding door into circulation spaces.
- Glass used in doors is safety glass and avoid all (completely) glass doors.
- How doors are hung with respect to other space in the building.
- Need to consider children locking themselves into bathrooms.
- Consider trapping hazards in the design of buildings, particularly with respect to door closers.

The last of these issues is clearly most relevant to the current study.

A guidance note has been written for Milton Keynes Schools on the issue of finger trapping (Milton Keynes 2006), as a result of a number of accidents that have taken place. The article discusses appropriate action that should be undertaken and where finger guard devices are required.

The guidance note recommends that the issue should be driven by Health & Safety risk assessments undertaken by head teachers. The main locations for finger guards have been indicated through accident numbers as follows:

- Classroom doors.
- Entrances to toilets and toilet cubicles.
- The guidance is mainly relevant to nursery schools and primary schools, but assessors should also consider need in secondary schools.

Further recommendations are made that in addition to these locations, finger guards should be fitted to doors next to where pupils congregate. As well as fitting equipment there are other ways in which the risk can be managed in these locations as follows:

- Reduce the need for pupils to gather near to doors.
- Ensure queues are in a different area.
- Give briefing to pupils on the dangers.

For new buildings, the number of necessary doorways could be minimised in areas where children would congregate, such as queuing for lunch. Where this is not possible, suggestions are made that the risk could be managed by fitting finger guard devices to doors.

The guidance suggests that for finger trapping devices (normally strip types for hinged doors), the protection can be started about 25 cm from floor level. The exception being where pupils could conceivably be on or near the floor with their fingers, for example during physical education or drama lessons or in the case of children with special needs. This would also apply where especially young children, e.g. nursery or primary age, were present.

For new schools a system of regular and brief visual inspection is advised, in order to check for damage or deterioration so that appropriate remedial action can be undertaken. Staff should report any damage and repairs be promptly carried out.

Norfolk County Council has also produced guidance on preventing finger trapping accidents for nursery, primary and special schools in their area (Norfolk County Council 2006). A risk assessment approach is recommended. Doors are categorised in terms of high, medium and low risk. High risk cases could include the following:

- Doors which pupils congregate next to;
 - Doors which pupils queue beside for lunch or other reasons;
 - Doors near entrances;
- Doors which are susceptible to being slammed shut by strong winds.

The following risk management practices are recommended for implementation:

- Reduce the queuing of pupils near doors considered to be high risk;
- If possible lock high risk doors;
- Brief pupils regularly on the risks of finger trapping;
- If the above is not possible, consider fitting finger trapping prevention equipment.

Norfolk specify that all newly constructed rooms and refurbishments, including toilet cubicles, have finger trapping prevention equipment fitted.

A range of manufacturers of finger trapping prevention equipment is listed. Most of the equipment is to cover up the hinge cavity or the hinge pin side. After such equipment is installed, its functioning and condition is to be checked regularly.

Hertfordshire County Council also takes a risk assessment approach to preventing finger trapping in its schools and has produced similar guidance to Milton Keynes Corporation and Norfolk County Council (Hertfordshire County Council 2005).

Individual service providers, such as the National Railway Museum in York, have produced guidance on risk assessments when visiting their premises. The issue of finger trapping is just one issue to be considered as part of that process. Schools groups and others are encouraged to carry out their own risk assessment prior to class visits (National Railway Museum 2006).

2.2 Standards

The following standards relate indirectly to preventing finger trapping in doors. BS EN 12650 is the European Standard for building hardware for powered pedestrian doors. Part 1 covers the product requirements and test methods. The size of gaps in doorways in which fingers could get trapped is stated. Protective devices, mainly electrical, are outlined for controlling the movement of doors and so preventing fingers getting trapped (BSI 1997a).

Part 2 covers safety at powered pedestrian doors. Danger points during the opening or closing cycle of sliding doors need to be safeguarded. (BSI 1997b).

BS EN 1154 is the European standard for building hardware, controlled door closing devices, requirements and test methods (BSI 1997c). This outlines methods of testing closing devices for doors so that they are safe to use.

2.3 Safety equipment

There is a range of equipment available to prevent fingers getting trapped in doors. This equipment varies in type and cost. There is an absence of guidance that has been produced by either the industry or independent bodies. The type of safety equipment that is used to prevent finger trapping is outlined in appendix B.

2.4 Risk assessment

An assessment of each doorway can be carried out to determine what the risks are and who is at risk. Nursery schools, primary schools and special educational needs schools require particular consideration.

Health and Safety risk assessments need to be undertaken as part of the normal course of running workplaces under relevant legislation. The health and safety assessors need to recognise the potential for fingers to be trapped in doors and to assess the risk of each individual door. In buildings such as schools the risks to children may be readily understood, however, other building types may have less use by children and the perception of risk may vary.

There are standard means of assessing the risk and determining the need for risk management action to be taken. The risk assessment is generally considered to be a product of the combined effect of the severity of the harm that is potentially caused together with the likelihood of such an event occurring. The assessment is in part subjective, but the output should be a measure of risk. A high number would indicate some risk management measures are required, whilst a low number tends to imply that no action is required.

Risk assessments are undertaken routinely in the operation of any building, but such an approach could easily be addressed during the design of new buildings. In particular, this would be in the context of achieving compliance with the Construction, Design and Management Regulations (CDM).

3 Surveys

Surveys of opinion and experience have been carried out with a number of the stakeholders in the design, construction and management of buildings within the various sectors identified as relevant to this study. A standard set of questions was developed as shown in appendix C. However, the amount of information obtained from the respondents was variable and required individual consideration of each response. The survey was directed at individuals and companies that were either known to BRE, were door industry related organisations or marketed finger trapping devices. The specific survey responses are detailed in appendix C. In some cases the discussions are duplicated where the parties cover more than one sector.

The survey responses can be summarised as follows:

- 1) Many stakeholders were not aware of the issue of inadvertently trapping fingers in doorways, although others gave anecdotal examples.
- 2) In general, there was no known guidance or standards for preventing finger-trapping in doors.
- 3) In specifying and fitting finger-trapping prevention equipment to doorways, the requirements of the Disability Discrimination Act will need to be considered.
- 4) Manufacturers of finger-trapping prevention equipment are selling significant amounts of equipment. It is being specified and fitted mostly in existing and new nursery and primary schools.
- 5) A risk assessment approach is used to determine which doors require them to be fitted to.
- 6) Finger-trapping prevention equipment is also sometimes fitted in sheltered housing, retail outlets, hospitals, libraries and leisure centres.
- 7) The cost of supplying and fitting finger-trapping prevention equipment is considered modest compared to the cost of doors or indeed the cost of paying out compensation for a serious finger injury following a finger-trapping incident.

4 Discussion

This study has considered the issue of finger trapping in doors and complements the review previously undertaken by the SBSA. The SBSA review (Appendix A) has shown that this type of injury occurs infrequently.

A literature search has been undertaken of the existing knowledge base of finger trapping in doors. Surveys of practitioners and manufacturers experience have also been completed.

4.1 Guidance and standards

The study has shown that there are no specific standards for finger trapping devices in the UK. There has been information and short guidance documents produced by a number of authorities for their own purposes. These are produced mainly by education authorities who have significant concern and experience over the safety of children. The guidance which has been developed usually encourages a risk assessment approach to determine whether or not to fit such equipment. The risk assessment approach adopted is not necessarily specific to the needs of new buildings and much of the installation guidance would appear to relate to existing buildings and doors.

The current lack of authoritative guidance, such as a British Standard for finger trapping devices is likely to make efforts to encourage or require regulatory compliance very difficult in practice. The exception would appear to be automatic doors, where the standard for power operated doors includes some guidance. The survey of practitioners indicated that there were wider concerns over the use of finger trapping prevention devices in the context of issues such as the impact on the performance of fire doors.

4.2 Equipment

The review has considered the extent of the available equipment to prevent finger trapping. A range of devices are available that can be used in different types of doors. This equipment is normally accompanied by fitting instructions, but the work can be carried out by homeowners or maintenance staff as opposed to trained fitters. The main area to guard for hinged doors is the hinge itself. There are also stoppers available for swing doors, pivot doors and sliding doors. However, the available equipment is predominantly designed to prevent injury on the hinged or pivoted side of the door. There was less emphasis on equipment to prevent injury on the lock side of the door.

The equipment is largely used as a retrofit item to doors and there is little evidence of use of dedicated original equipment for new manual doors. The trade associations for the timber door and aluminium door industries do not deal with finger trapping issues and they do not produce guidance.

The majority of the finger trapping device equipment is based on plastic or rubber inserts to fill gaps and prevent fingers being caught as a door closes. The longevity of the equipment has been estimated as around ten years, which may be as little as a third of the lifetime of the door itself. There were concerns expressed in the surveys that the equipment would become dirty and would be difficult to maintain in a clean condition, with clear public health concerns arising from this likelihood. This would be a concern to

building owners and managers and possibly resulting in even more frequent changing, or indeed removal, of the equipment.

An alternative to the gap filling devices is the use of door closers that control the speed of a closing door. This type of equipment is commonly fitted for fire doors and for other types of automatic doors. The equipment does not prevent finger trapping as there will still be gaps on the hinged sides of doors. However, door closers should prevent injury by doors slamming shut in a strong wind. The door closer checks the door at about 15° before it latches, and slowly closes the door from this situation. A door closer can help to prevent finger trapping on the lock side as well as hinge side of the door.

The cost of equipment is typically quite low and can be estimated to be between 2% and 10% of the cost of the door itself. The equipment purchase costs from as little as less than £10 up to around £30. The cumulative impact of these costs would require further consideration particularly when fitting safety equipment in either homes or non domestic buildings. In an average home with around 12 doors the overall cost may therefore be between £120 and £360. The door closer devices are priced higher, at least £50 per door. These are typically used at present for fire doors and entrance doors to ensure security, safety and heat retention. The cost of labour for fitting finger trapping prevention equipment or door closer equipment would also need to be considered.

4.3 Surveys

Surveys have been undertaken of practitioners and suppliers in the door and construction industry in the four sectors of interest. Of these the education sector appears to be the one where most focus on finger trapping has taken place in recent years. The major market for suppliers of equipment is in nursery and primary schools, with less use in secondary schools or higher education.

The interesting aspect of the survey was the low level of concern expressed over finger trapping by those surveyed. The survey was not intended to be representative of the attitudes of the industry as a whole, but as a picture of practitioners in Scotland demonstrated that amongst those surveyed this is not a major area of concern or indeed knowledge. At the same time a number of incidents were recorded by the respondents, which made it clear that problems do occur in the different sectors. There was a lack of awareness or indeed action by clients, owners, designers and the door industry in most sectors, other than education.

Some of the respondents expressed a link between finger trapping and the requirements of the Disability Discrimination Act (DDA). This thought process has resulted in some doors having finger-trapping prevention equipment fitted. The DDA covers the access to Education, Employment and Goods and Services for disabled people. Disabled people with reduced mobility may hang onto doors and door frames with a greater risk of fingers being trapped than other building occupiers. Therefore they will be at greater risk of finger trapping accidents. Failure to fit finger trapping devices in buildings may be viewed as being in contradiction with DDA compliance. However, there does not appear to be any incidents of organisations being sued under the DDA legislation as a result of finger trapping incidents (DRC Web site).

A risk assessment approach is undertaken in existing schools to prioritise the doorways requiring finger-trapping prevention equipment. This approach was also undertaken for the shopping centre discussed with the building owner. Little equipment is known to be fitted in homes; most parents may not be aware of the range of consequences of children trapping their fingers in doors, or are not aware of the availability of and the modest cost of finger-trapping prevention equipment. Automatic closers can be fitted to doors in public access buildings which ensure that these doors close slowly, reducing the risk of finger-trapping.

Although the cost of the equipment is low compared with the cost of the door, some of the equipment only has a ten year guarantee, so may need to be replaced before the door. Indeed, the finger-trapping equipment may deteriorate more quickly than the door and frame, which was a specific concern of at least one respondent.

In summary the surveys did not demonstrate a broadly based demand or need for finger trapping devices to be fitted to doors. However, further consideration of this issue would be required before the surveys could be considered a representative view of the industry in Scotland.

5 Conclusions

This study has considered the issue of finger trapping in four sectors for the SBSA. The work has focussed on the equipment available, guidance, costs and experience of industry. The following conclusions are drawn from the investigation:

- Finger trapping in doors has been demonstrated as a cause of a relatively small percentage of common accidents amongst young children by the SBSA study. Also a small number of finger trapping incidents occurred among adults and the elderly.
- There is equipment available to prevent finger trapping injuries for various types of doors. The equipment is predominantly based upon the addition of plastic strips to doors on the hinged side. Door closers can also be used to minimise the risk of injury on both the hinged and lock sides of the door.
- The cost of the finger trapping prevention devices is relatively low and is unlikely to exceed 10% of the cost of the door. However, there is a need to consider the whole life costs and performance as the equipment may only have a lifetime of 10 years and therefore much less than the door leaf itself.
- The impact of the fitting or safety equipment on fire and smoke performance needs further consideration. The absence of a recognised industry standard for finger trapping devices, particularly for manual doors, is a drawback for the compulsory fitting of such equipment in the different sectors.
- The surveys of industry undertaken were intended to give a picture of opinion in Scotland. There appeared to be only minimal awareness of the issue and the extent of problems caused by fingers being trapped in doors. The greatest level of awareness was observed in the schools sector, with a substantial number of products being used in nursery and primary schools.

6 References

British Standards Institution, BS EN 12650 - Building hardware – powered pedestrian doors, Part 1 – Product requirements and test methods, BSI, London, UK, 1997a.

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British Standards Institution, BS EN 1154 – Building hardware – controlled door closing devices – requirements and test methods, BSI, London, UK, 1997 c.

Building Research Establishment Report, Building Regulation and Safety, 1995.

Milton Keynes Corporation, Finger trapping accidents, MKC, UK, 2006.

National Railway Museum, Health and safety on site at the National Railway Museum, NRM, York, UK, 2006.

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Hertfordshire County Council Health and Safety Risk Management Team, Finger trapping accidents, Health and Safety newsletter, September 2005, Issue 11, HCC, Hertford, UK, 2005.

Appendix A: Background research provided by SBSA

.1 Unintentional Injuries in Children - Finger Trapping

Purpose

1. This paper brings together research and statistical evidence on finger trapping incidents in children in Scotland. The paper will be used by the Scottish Building Standards Agency, to consider whether it should address the issue of finger trapping and whether it should be covered in a forthcoming Amendment of the Technical Handbooks.
2. Finger trapping, for national coding purposes in the National Health Service (NHS), is classed as an unintentional injury. To ensure that finger trapping is considered in context then this paper also considers the wider issue of unintentional injuries.
3. Information on childhood accidents is not monitored centrally. However, NHS National Services Scotland (NHS NSS) does collect some information on childhood accidents using the Scottish Morbidity Record (SMR01).

Background

4. The profile of finger trapping has been raised in the last 2 to 3 years by Dr N V Doraiswamy, a former Consultant in Paediatric Accident and Emergency Medicine at Yorkhill Children's Hospital, Glasgow. In 1993 Yorkhill, the largest children's hospital in Scotland, introduced the use of the Children's Hospital Injury Reporting and Injury Prevention Programme (CHIRPP). CHIRPP, which originates from Canada is a computerised information system that collects data on all patients (up to 16 years of age) presenting with all types of injuries to the A&E department.
5. In 1999 Dr Doraiswamy published a paper (1) on 'Childhood finger injuries and safeguards'. The paper recorded the results from 283 children who attended Yorkhill with finger injuries over a six month period during 1999. The majority of the children were aged 5 or under who had their fingers jammed or crushed in a door either at home, school or nursery where the door was accidentally closed by another person, most commonly by another child.
6. The study revealed that younger children crush their fingers more on the hinge side of the door and older children on the lock side. Rather than the children's injuries being minor the study revealed that 22% (62) required treatment for bone or joint injuries, 7% (18) required operations, and 6% (16) required treatment for digits amputated at the time of incident.
7. The paper concluded that finger injuries are common, especially in preschool age children and are mostly caused by jammed fingers in doors at home. Furthermore, it considers the facts that finger injuries cause immediate pain and possible inability to play or participate in activities. More seriously injuries may cause deformity, disability or restrict the use of the finger.

8. In March 2004 SBSA staff met with Dr Doraiswamy and Mr McNulty, MSP. This paper takes forward the undertaking given to consider the issue in more detail.

9. A similar study(2), conducted over a 5 month period was undertaken at the A&E Department of The Royal Aberdeen Children's Hospital during 1999. This study recorded all fingertip and nailed injuries due to trauma from a door where fingers were either shut in the door itself or were trapped in the hinge as the door is closed. There were 188 incidents representing 2% of all paediatric injuries presenting during the period of these 39% of the cases patients were under 4 years old. 147 (75%) of the patients had sustained relatively minor injuries the remaining 25% had more serious injuries e.g. avulsion of the nail from the nailed or amputation of part of the fingertip.

Incidences of Unintentional Injury

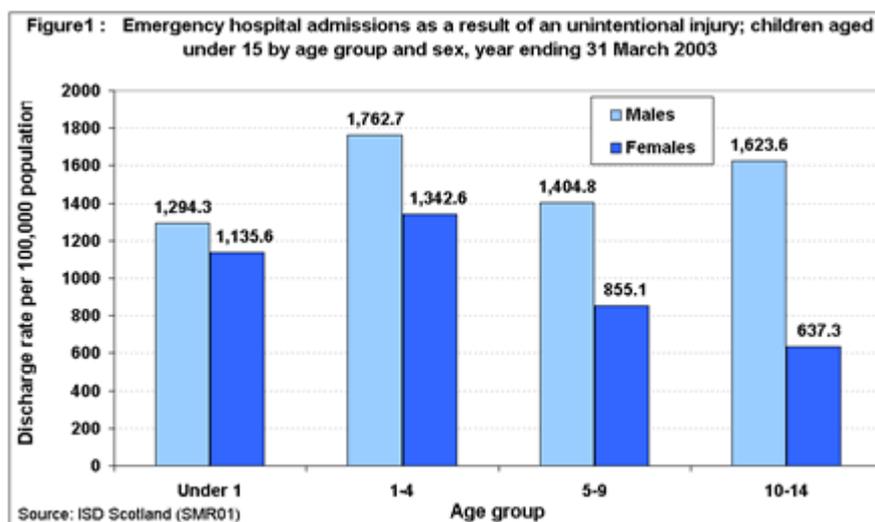
10. Scottish Health Statistics (3) report that unintentional injury is the most common cause for hospital admissions in children. The term "unintentional injury" is preferred to "accidents" as the latter implies events are inevitable and unavoidable whereas a high proportion of so-called accidents are now regarded as being preventable. Unintentional injuries can occur in any age group, but children and the elderly are more vulnerable.

11. Unintentional injuries may occur at home, at work, on the roads and at school. Information for children focuses on four main age groups (under 1, 1-4, 5-9, and 10-14), where the type of injury reflects the child's state of development, changing perception of danger, types of activity and levels of responsibility.

12. Most unintentional injuries don't result in hospital admission but are treated by GPs or as outpatients in Accident & Emergency departments, or by the child's parent or carer.

Injuries in Children by Age Group and Sex

13. The following chart shows that in all age groups, boys are more likely than girls to be admitted to hospital owing to unintentional injury. The total number of emergency admissions for the year ending March 2003 shows 7,139 male admissions compared with 3,957 female admissions.



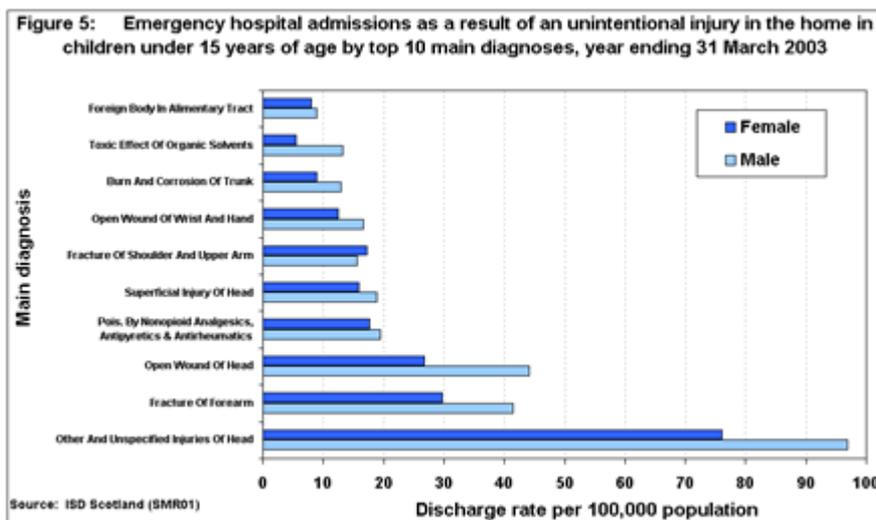
14. In both sexes, the most common cause of emergency admission for injury is falls. In the 1-4 age groups, poisoning is a common cause of admission but rarely causes death.

15. Information is derived from two sources: death data is provided by the General Register Office for Scotland (GROS) and hospital inpatient data from the Scottish Morbidity Record (SMR01). Population data are taken from the mid year population estimates and the 2001 population census, both are provided by GROS.

Injuries in Children by Top 10 Main Diagnosis

16. Unintentional injuries in the home account for approximately 1 in 3 of all emergency hospital admissions for children aged fewer than 15. The top ten main diagnoses for children who were admitted as an emergency following an unintentional injury in the home for the year ending March 2003 were: other and unspecified injuries of head; fracture of forearm; open wound of head; poisoning by nonopioid analgesics, antipyretics and antirheumatics; superficial injury of head; fracture of shoulder and upper arm; open wound of wrist and hand (includes injuries from finger trapping); burn and corrosion of trunk; toxic effect of organic solvents; and foreign body in alimentary tract.

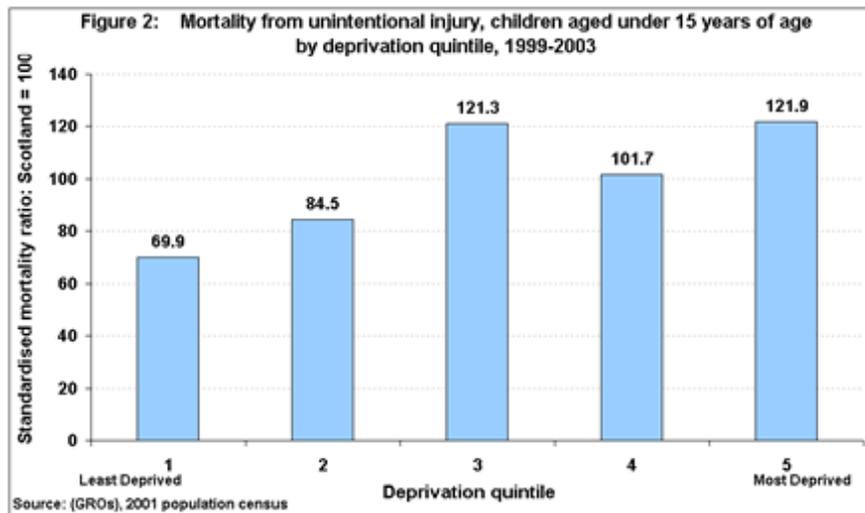
17. Information on finger trapping is not collected as a separate entity but is included within the data on open wound of wrist and hand, as detailed above.



Injuries in Children by Deprivation

18. The risk of unintentional injury in childhood increases with increasing socio-economic deprivation. The following chart shows the association between mortality from unintentional injury and deprivation for children under the age of 15 years during 1999-2003. Death rates from unintentional injury are almost double for the most deprived children compared with their most affluent contemporaries.

19. This data should be treated with caution, as ratios are based on small numbers and may vary significantly from year to year. However, the data raises the question of whether the incidence of injury is greater in poorer areas.



20. Good data on injuries is important for planning prevention programmes. The data available from GROs and SMR01 gives some idea of the number of deaths, hospital admissions and types of injuries. However, little information is readily available on the severity of injuries and their cause.

.2 Raising awareness of Unintentional Injuries

21. The need to raise public awareness of unintentional injuries is a recurring theme in the NHS. In 1999 the NHS White Paper towards a Healthier Scotland (www.scotland.gov.uk/library/documents-w7/tahs-00.htm) emphasised the need for more to be done at a strategic level to provide direction, and to coordinate efforts to reduce unintentional injury.

22. This was highlighted again in 2002 by the Chief Medical Officer in his Annual Report (www.scotland.gov.uk/publications/2003/06/17181/22117) which identified ways in which injury prevention could be improved by:

- better co-ordination of prevention at national and local level
- better targeting of preventive measures and
- a more effective framework for taking action on the data we already have.

23. In 2003 NHS Health Scotland commissioned Dr David Stone, Professor of Paediatric Epidemiology in Yorkhill Hospital to write a paper on injury in childhood. The outcome was 'Injury in Children, A Research Briefing Paper' which sets out the current situation and context of childhood injury in Scotland. The paper concluded that the largest single cause of child death due to injury is road traffic accidents followed by those occurring in the home. It was intended that this paper would be used to raise awareness and its main recommendation was the development of a national strategy for child injury prevention in Scotland. A copy of the Injury in Child book can be found in the G Drive at the following location - G:\DD\SBSA\Research\LINDA AND COLETTE\research inventory\finger tip injuries.

24. On 8 December 2004 the Chief Medical Officer, chaired the Child Injury Prevention Seminar during which Dr David Stone's recommendation were discussed. At this meeting it was decided that Scotland

would participate in the wider European programme being developed by the European Child Safety Alliance involving 18 countries across Europe in developing Child Safety Action Plans (CSAP). The initiative is still in the early stages with stage one involving the gathering of information and development of a discussion paper, the second stage will be to consult on the discussion paper and raise awareness of the project.

25. The CSAP project aims to develop indicator across all the participating countries. There will be a core set of indicators covering child unintentional injury generally and seven issue specific sets for the top causes of child mortality due to injury. The seven specific sets are motor vehicle passenger, pedestrian, cyclist, drowning, falls, burns & scalds and poisoning. These are designed to establish a consistent way of assessing the state of child injury across the participating countries. The project is however still developing and plans and ideas on what to take forward are still being discussed.

([http://www.childsafetyeuropoe.org/csi/ecsa.nsf/index/home/\\$file/index.htm](http://www.childsafetyeuropoe.org/csi/ecsa.nsf/index/home/$file/index.htm))

26. In 2004 the Scottish Executive procured a licence for a specialist A&E IT system for NHS Scotland. The system once operational, will be used to record the reason for all attendances in A&E. Using this system it will be possible, in the future, to obtain accurate information on finger trapping. The National Clinical Dataset Development Programme is in the process of circulating their A&E Core Data Standards for consultation. Once accepted this Dataset will ensure information is collected in the same format. The system is being rolled out to the NHS with only Lanarkshire and Grampian currently live. The system will continue to be rolled out throughout 2006.

.3 Evidence of Finger Trapping

27. Finger trapping is not an injury that is recorded singly within data collected by the NHS. The following table gives details on the number of children (aged under 16 years) admitted to hospital in Scotland as either inpatient or day case discharges with 'injuries to the wrist or hand' with an external cause of 'caught, crushed, jammed or pinched in or between objects'.

28. What these figures show is the number of cases where further treatment is required and where the patient is admitted to hospital. What the figures do not record is the number of cases which attend A&E, receive treatment and then go home. Furthermore, there is no way to quantify the number of injuries that are treated outwith hospital.

Number of children (under 16y) admitted to hospital as inpatient/day case with injuries to wrist or hand

Year ended 31 Dec:	1999	2000	2001	2002	2003	2004 ^p
Home Incidents	231	210	220	162	157	159
Incidents outside the home	188	159	159	203	186	165
Total	419	369	379	365	343	324

Source: SMR01- captures data from inpatient/day case discharges from non-obstetric/non-psychiatric specialties, ICD-10 principal diagnosis: S60-S69, ICD-10 secondary diagnosis: W23

P Provisional

"Year ended" based on date of discharge

The same patient may be counted in separate years if they had admissions in different years

29. The cause codes are not specific and do not identify doors and may include incidents involving windows and cupboards etc.

30. To look overall at the issue there is a need to gauge the number of incidences of finger trapping in relation to the total number of treatments. The following table gives details of the total number of children (aged under 16 years) admitted to Scottish hospitals as inpatient or day case discharges for any reason.

Total number of children (under 16y) admitted to hospital as inpatient/day case for any reason

Year ended 31 Dec:	1999	2000	2001	2002	2003	2004 ^P
Home Incidents	4,536	4,149	4,068	3,814	3,465	3,367
Incidents outside the home	80,692	75,871	73,408	72,718	72,089	69,837
Total	85,228	80,020	77,476	76,532	75,554	73,204

Source: SMR01 - captures data from inpatient/day case discharges from non-obstetric/non-psychiatric specialties

P Provisional

"Year ended" based on date of discharge

The same patient may be counted in separate years if they had admissions in different years

31. Looking at the overall numbers of incidences allows us to put into context, as far as is possible the incidences of finger trapping (cause code is injuries to wrist or hand and therefore it is reasonable to assume all incidences will not be finger trapping). The following table showing the incidences as a percentage of the total number of children treated in the years 1999 - 2004.

Number of children with injuries to wrist or hand shown as a percentage of the total number of children admitted to hospital as inpatient/day case

Year ended 31 Dec:	1999	2000	2001	2002	2003	2004 ^p
Home Incidents	5.09%	5.06%	5.40%	4.24%	4.53%	4.72%
Incidents outside the home	0.23%	0.20%	0.21%	0.27%	0.25%	0.23%
Total	0.49%	0.46%	0.48%	0.47%	0.45%	0.44%

.4 Conclusion

32. Statistical evidence shows that the incidence of finger trapping (cause code injuries to wrist or hand) in children in Scotland accounts for a relatively small percentage of the overall incidences of unintentional injury in children. The table in paragraph 31 shows that in total from 1999 to 2004 the percentage of injuries to wrist or hand including finger trapping incidents never reached 1% of the total number of unintentional injuries sustained by children.

33. In looking at this evidence it needs to be remembered that the figures represent only cases where there has been inpatient/day case activity. There are no statistics collected which provide information on the number of cases seen in A&E Departments where no follow-up is required.

.5 Next Steps

34. The Agency need to decide if there is sufficient evidence in this paper or if further research is required to look at incidents in the home or outside the home.

35. If there is sufficient evidence in this paper to make a decision then the question is does the incidence of finger trapping warrant further action and possible changes to the Technical Handbooks?

36. Furthermore, given the ongoing work within NHS Scotland and the involvement in the European Child Safety Alliance is there sufficient interest elsewhere to ensure the issue is taken forward without involvement from the Agency.

Colette Templeton, September 2005

(1) N V Doraiswamy Injury Prevention Paper 1999

(2) Scottish Centre for Infection and Environmental Health Weekly Report 5 October 1999, Volume 33 No 99/40 – MacGregor DM & Hiscox JA Fingertip trauma in children from doors Scot Med journal 1999; 44

(3) ISD Scotland – Scottish Health Statistics

Appendix B: Finger trapping prevention equipment

The range of safety equipment that is commonly used to prevent finger trapping is outlined as follows:

.6 Hinge cavity protector

When a hinged door, whether manual or automatic, is opened a large gap appears between the door and the frame. This hinge cavity can create a potential hazard for small fingers.

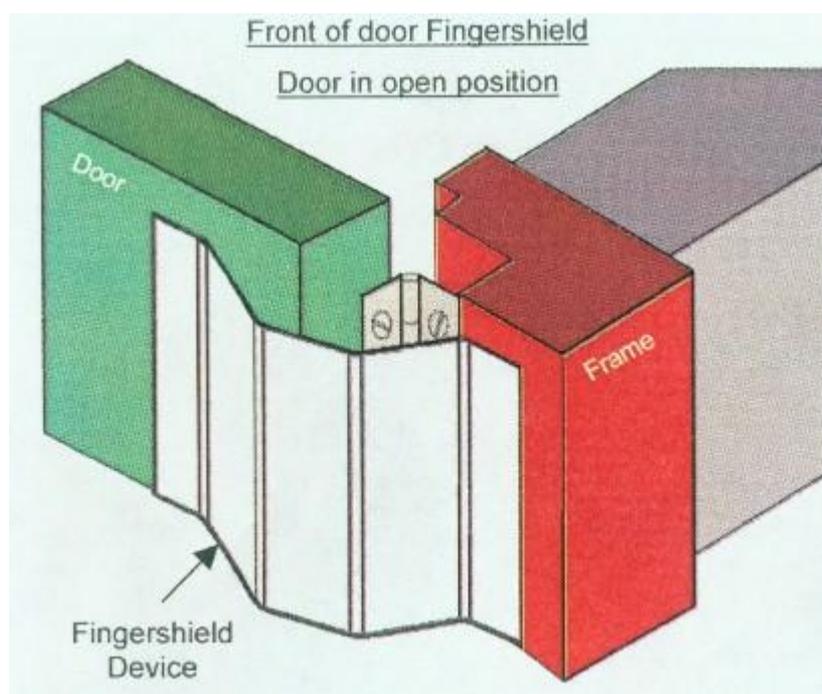
When the door is closed, whether by a person or a door closer, the gap disappears and a huge force is exerted. Anything placed in the gap is crushed and injuries are caused which can vary from bruising to permanent damage.

The use of hinge cavity protectors can prevent accidents occurring. They are typically inexpensive and simple to apply to a door. A hinge cavity protector completely covers the gap (figure 2), thus making it impossible for anything to be trapped between the door leaf and the frame.

Products like these will typically work by being pressed into folds that close together as the door is closed. If the door is opened then the plastic strip opens up and fills the gap thus preventing insertion of fingers. Generally this type of equipment is applied as a retrofitting measure in buildings. Manufacturers will supply screws and the plastic protector has predrilled holes.

The cost of purchasing this equipment typically lies in the range of £10 to £30 per door.

Figure 2: A small section of a hinge cavity protector

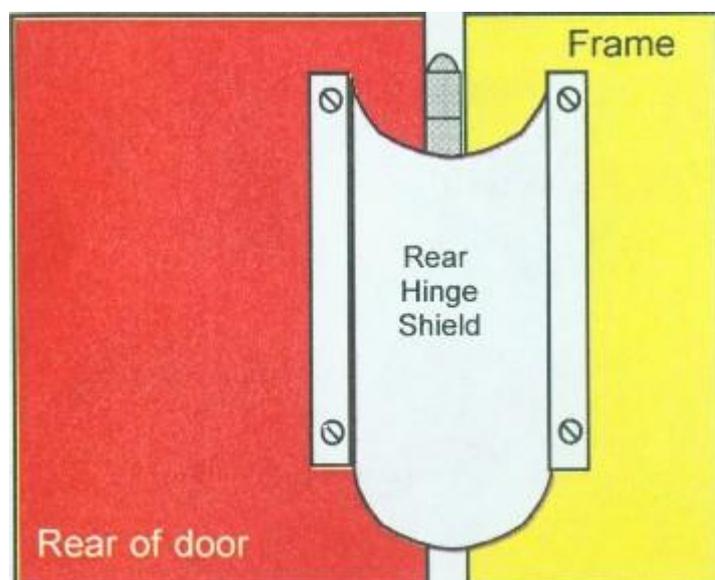


.7 Hinge pin side protector

Although a small gap, the hinge pin side of an open door may be large enough that a small finger might be inadvertently inserted. If the door is then closed accidentally, a huge force would be exerted on that finger, crushing it and causing permanent damage or loss of the finger.

The use of a hinge pin side protector can prevent such accidents happening. A hinge pin side protector covers completely the door hinge and the gap, preventing fingers getting trapped (figure 3). The device is a flexible piece of plastic which flexes as the door is opened or closed. It is fixed using screws linking the door to the frame. A full length piece for a standard door costs approximately £7.

Figure 3: A small section of a hinge pin side protector



.8 Swing door stopper

A swing door stopper prevents the swing door being slammed shut on fingers against the door frame. A piece of horseshoe shaped foam is fixed to the frame where the closing door would make contact. This prevents the door from closing shut. This costs in the region of £4 per door.

.9 Pivot door

Pivot doors create a potential danger area between the door and the frame. Conventional pivot doors are hung with their pivot axis at 50 mm to 70 mm from the frame, which creates a large enough gap for fingers to be trapped and crushed once the door starts to close.

Equipment is available to prevent trapping in pivot doors between the door and the frame. The shielding strip is fixed to the frame and the barrier member is fixed to the door, both using self tapping screws. This combination effectively fills the gap and prevents finger trapping in pivoted doors.

The cost of this equipment typically lies in the range of £10 to £30 per door.

.10 Sliding door stopper

A sliding door stopper prevents fingers getting trapped in patio or other sliding doors. It is a soft compressive material on the frame and the adjacent side of the door so that if the door slides towards the frame, fingers in between will not get damaged. It costs approximately £5 per door.

.11 Door closers

Double hinged internal fire-proof doors usually have closers at the top which cause them to close automatically but in a slow, controlled manner. This reduces the opportunity or impact of trapping fingers between them.

.12 Automatic doors

Doors can have automatic controls fitted to allow them to open and prevent them from closing when a person is near by but also close slowly and gently.

Appendix C: Telephone survey questionnaire and results

.13 Prevention of finger-trapping in doors in Scotland – questionnaire

A. Introduction

The Scottish Building Standards Agency (SBSA) is employing BRE Scotland to investigate finger-trapping in doors in various types of buildings:

- Retail – shops, shopping centres
- Education – nurseries, schools
- Public access – hotels, conference centres, community halls, entertainment venues, sports facilities
- Domestic – houses, flats, residential care homes

Finger-trapping incidents are likely to involve infants, children or the elderly. SBSA wants to find out what equipment, guidance and precautions are currently used to prevent or limit incidents of finger-trapping. The results of this research can inform a possible future revision of the building standards in this area.

B. Questions

1. What experience have you had relevant to finger-trapping in doors and related means of prevention?

2. What equipment do you make, sell, buy or use to prevent finger-trapping in doors?
What is your experience of this equipment?

3. How do you assess the need for finger-trapping prevention equipment?

4. Is finger-trapping prevention equipment fitted in new buildings?
What are the issues involved?
Who decides what equipment to use?

5. Is finger-trapping prevention equipment fitted in existing buildings?
What are the issues involved?
Who decides what equipment to use?

6. What is the cost of new and retrofit finger-trapping prevention equipment per door or as a percentage of the cost of a door?

7. What existing guidance or standards are you aware of for finger-trapping prevention equipment?

.14 Results of telephone surveys

Domestic sector

Architect

Finger trapping in doors in domestic and assembly buildings is apparently not a major issue. He has experienced two cases of children trapping their fingers in the hinge side of garden gates.

Community buildings have external doors with automatic closers that close the doors slowly or are sprung doors. For a community building, a pair of external doors could cost £800 whereas the door closers could cost £50, approximately 6% of the cost of the doors.

There is no known guidance or standards for finger-trapping prevention equipment. The standard text book, 'Housing for varying needs'. HMSO, 1995, ISBN 3011 495 910 does not mention finger-trapping in doors.

Door equipment manufacturer

Has been a technical witness in two court cases for finger-trapping in doors.

Uses a pivot safe finger protector mainly for automatic doors and a hinge safe finger protector mainly for manual doors. Finger-trapping prevention equipment is recommended for new buildings but sometimes in 'Design and Build' projects it is avoided to cut costs.

Finger-trapping prevention equipment is fitted in existing sheltered housing and schools.

For retrofit, hinge safe and pivot safe equipment costs approximately £10 to £30.

No guidance is known of for manual doors whereas there is guidance for automatic doors in the British Standard.

Industry association representative

Has come across anecdotal evidence of finger-trapping in doors. The wide gap between the door and the frame of cubicles in public toilets can be a problem. Once a mother was inside a cubicle and her child trapped finger(s) in the gap between the door and the frame.

The requirements of the Disability Discrimination Act need to be considered.

Risk assessment should be used in assessing the need for finger-trapping prevention equipment. Sometimes, finger-trapping equipment is fitted in existing buildings.

Would cheap finger-trapping prevention equipment affect the fire resistance of doors. Good performance data and a standard for such situations would need to be developed. He questioned how anyone would be able to compare plastic, timber and metal doors with the current state of knowledge.

There are no standards or guidance known in this area.

Housing association

Finger-trapping in doors is not considered to be a major issue for the housing association; there have not been comments or complaints from residents. They do not fit finger trap devices in their properties at present.

Assembly buildings

Facilities manager

Has experience in a school where a child trapped their fingers in the hinge side of a door. There have been no cases of finger-trapping at the hotel in question. No finger-trapping prevention equipment has been fitted in the hotel. The cost of such equipment is unknown. Do not know of existing guidance or standards for such equipment.

Architect

Has no direct experience of cases of fingers getting trapped in doors. He thinks that hinge cavity protector or hinge pin side protector would look unsightly and may become "tatty" before the door and frame reached that state. He is not aware of any existing guidance or standards.

Contractor

Has no experience of finger trapping in doors. Contractors would fit them to doors if required to by a specification or via regulation. However, at present designers and clients do not appear aware of the issue.

Industry association representative

He has no direct experience of preventing finger-trapping in doors but it does relate to the Disability Discrimination Act. The trade association does not sell or specify finger-trapping equipment. However, the need for finger-trapping prevention equipment should be assessed by a risk assessment approach. For fitting finger-trapping equipment to new or existing buildings, the person responsible for the building (such as architect or facilities manager) should decide which equipment to fit. Public safety is most important. The cost of finger-trapping equipment is a small proportion of the cost of new aluminium doors, approximately 5%. No existing guidance or standards are known of for finger-trapping prevention equipment.

Door equipment manufacturer

They manufacture and fit finger-trapping prevention equipment in leisure centres and hospitals as well as retail outlets such as the Burger King chain, schools, nurseries, but few homes. The need for finger-trapping equipment is determined by taking a risk assessment approach. The equipment is specified for new buildings as well as being retro-fitted in existing buildings. The equipment can cost 10% of the value of a door. The equipment costs less in multiple orders. There are no existing standards or guidance.

Schools

Council architect

Finger-trapping prevention equipment is being fitted to certain doors in the nursery areas of new schools in the council area. A risk assessment approach is being used to determine which doors require guarding.

Contractor

Finger-trapping prevention equipment is being fitted to certain doors in the nursery areas of new schools.

Industry association representative

Finger-trapping is not considered to be a major issue; there has been one enquiry in thirteen years.

Door equipment manufacturer

The company supplies and fits the following finger-trapping prevention equipment:

- Hinge cavity protector, cost is approximately £23 per door;
- Hinge pin side protector, cost is approximately £7 per door.

The company gives a ten year guarantee on this equipment and is involved in supplying equipment mainly to retrofit existing schools. Equipment has been supplied to 22 of the 32 Scottish local authorities. 5000 devices were sold to Angus and 2000 to Moray Council, most for doors in nurseries and primary schools. In Scotland, the local authorities do the specifying of finger-trapping prevention equipment whereas in England, the specification is undertaken by the local school head teacher who controls the budget.

On visiting a school, Howard carries out a risk assessment with the head teacher or janitor. They prioritise the doors, determining which high, medium and low risk to pupils is. Talking to pupils, many less serious finger trapping incidents or near misses may go unreported.

Architects may specify finger-trapping prevention equipment for new buildings but they get the equipment direct from headquarters. Do not know of any existing guidance or standards for finger-trapping prevention equipment. There may be standards in some Scandanavian countries

Retail

Building manager, shopping centre

A risk assessment approach has been used. Finger-trapping prevention equipment has been fitted on doors in the crèche area and on doors in the shopping malls near the crèche. There have been no reported incidents of finger-trapping. The cost of fitting finger trapping prevention equipment is relatively modest compared with the cost of paying out compensation for serious injury if a finger trapping incident occurred.

Contractor

Has no experience of finger trapping in doors, similar to the situation for public access buildings.

Industry association representative

Finger-trapping in doors is not considered to be a major issue; there has been one enquiry in thirteen years. They do not issue guidance in this area and have had no contact from their membership with regard to what is commonly offered in the different sectors.

Door equipment manufacturer

He invented equipment to prevent fingers getting into the hinge side and the hinge pin side of one way opening hinged doors and similar devices for two way pivot or swing doors.

The company employ surveyors who carry out a risk assessment of existing buildings before retro-fitting finger-trapping prevention equipment. Areas in schools of high risk include areas where children congregate, queue or hang around such as doors off corridors.

Equipment is being sold to a range of shops including Sainburys and Boots. Also the equipment is being fitted in libraries.

Hinge side equipment costs £25 at list price and hinge pin equipment costs £15 at list price. There are discounts for bulk orders. The equipment probably costs 10% of the cost of a door.

There are known recommendations for finger-preventing equipment but no known standards.