

# Childhood finger injuries and safeguards

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## Abstract

**Objective**—To understand the epidemiology, sites, and mechanism of finger injuries in children and to consider safety measures.

**Setting**—Accident and emergency department of a children's hospital in Glasgow.

**Methods**—A prospective study was carried out with a specifically designed questionnaire. Altogether 283 children presenting with isolated finger injuries were identified over six months. Available safety measures to avoid or reduce damage from such injuries were considered.

**Results**—Finger injuries were common (38%) in those under 5 years. Most of these occurred at home (59%), commonly (48%) because of jamming between two closeable opposing surfaces, and mostly (79%) in doors at home and school. The doors were commonly (85%) closed by someone and often (60%) by a child. Sixteen (6%) were treated for amputation.

**Conclusion**—Finger injuries are common, especially at the preschool age, and are mostly caused by jammed fingers in doors, at home. Safeguards should be considered according to location, like home or institutions, and expense.

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Keywords: finger injuries; safeguards

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Table 1 Causes of finger injuries

Cause	No (%)
Jammed	136 (48)
Fall	63 (22)
Hit	31 (11)
Others	27 (10)
Cut	26 (9)
Total	283 (100)

Table 2 Locations of doors causing finger injuries

Area	No (%)
Living room	43 (40)
Toilet/bath	27 (25)
Front door	12 (11)
Kitchen	9 (8)
Back door	7 (7)
Bedroom	4 (4)
School	6 (5)
Total	108 (100)

Finger injuries in children are important. They create immediate problems like pain, inability to play or participate in school activities, apart from the anxiety felt by parents about recovery, deformity, use of fingers, disability, and shortening. It is important to know the causative factors so that preventive measures can be implemented.

## Patients and methods

A prospective study was carried out on 283 children aged less than 14 years who presented with finger injuries during a six month period to the accident and emergency department of Royal Hospital for Sick Children, Glasgow. Children with finger injuries, including those involving the adjacent metacarpal, were included but those with additional injuries elsewhere in the hand or body were excluded, as were thermal injuries and bites. Details of injuries were recorded in a specifically designed questionnaire. Radiological investigations were done on all children with a history of jammed fingers and in others suspected for the presence of foreign bodies or bony injuries.

## Results

Finger injuries were commonly noted in younger children: 107 (38%) aged less than 5 years, 91 (32%) from 5-10 years, and 85 (30%) over the age of 10 years. The majority of injuries occurred at home (168, 59%); the remainder were at nursery/school (46, 16%), park/playground, outwith school/nursery (41, 15%), car (12, 4%), and others 16 (6%). The causes of injury are shown in table 1. Fingers were jammed/crushed in the opposing surfaces in 136 children: doors in 108 (79%; 102 (75%) at home and six (4%) at school), car doors in 12 (9%), gates in nine (7%; five (4%) at home and four (3%) in the playground/park), and "others" in the remaining seven (5%). The locations of the doors involved in such injuries are shown in table 2. Among these 136 children with jammed fingers, 67 (49%) caught their fingers at the hinge side, 52 (38%) at the lock side, seven (5%) in the middle of a double door or gate or cupboard. Ten (8%) parents/children were not sure about the site. Table 3 shows the sites of jamming and severity of injuries according to age. The doors were closed by another child (47%), an adult (25%), spontaneously (15%), and self (13%).

Emergency exploration and suturing for suspected tendon injuries and/or foreign bodies were required in 12 (4%) and six (2%) due to laceration. Sixteen (6%) children were treated for amputated digits (table 3). Bone/joint injuries were treated in 62 (22%) children. Wound approximation with Steristrips and/or dressings was done in 136 (48%) children. Treatment for less than a week was required in 214 (75%) and for the remaining 69 (25%) children for more than a week (including eight (3%) for more than four weeks).

## Discussion

In the only children's hospital in Glasgow, 1.8% of the attendance was caused by finger injuries. The true incidence of finger injuries is unknown as children are treated in all the other hospitals in the city, and also by general practitioners in their own surgeries. Relatively minor injuries are often managed by parents and school nurses. The study did not include injuries elsewhere in the body in addition to finger injuries. Therefore, a limited study for a short period of time in one hospital in the city indicates the importance of finger injuries in children.

The study indicates that the majority of injuries are caused by fingers being jammed or crushed in doors. Doors at home have been noted to be the commonest location: 83%.<sup>1</sup> Although jamming injuries occur in the hinge or lock side or the middle of double doors, gates, or cupboards (table 3), younger children (<10 years) crush their fingers more on the

Table 3 Sites and severity of finger injuries caused by jamming or crushing in all locations for different age groups

Age (years)	No	Hinge side	Lock side	Middle	Not known	Amputation		
						Proximal to nail	At nail	Distal to nail
<5	58	31	18	3	6	0	0	0
5-9	47	25	17	2	3	4	3	1
>10	31	11	17	2	1	3	2	3
Total	136	67	52	7	10	7	5	4

hinge side (53%) and older children (>10 years) on the lock side (55%) confirming earlier observations.<sup>1</sup>

**Implications for prevention**

At present there are no regulatory requirements for safety measures on doors to stop finger jamming injuries in Britain, US, Canada, Australia, or Denmark where preventive measures for injuries are, in general, well advanced. Some such measures are available commercially in Australia (personal communication)<sup>2</sup> and Denmark (unpublished data).

Parents and institutions where children have access to doors should consider the following to avoid or minimise damage to the fingers.

I(A) *Doors kept open, not easily closeable*—(1) Stoppers can be kept beyond the reach of the child so that the doors cannot be closed completely. Metal, wooden, plastic, or rubber materials can be inserted between the opposing surfaces: (i) this can be kept between the closing surfaces on the hinge or lock side (fig 1) or top of the door and removed at will; (ii) a stopper can be fixed on the frame beyond the reach of the child with a hinge, and can be opened or closed at will between the closing surfaces on any side except over the floor. (2) Sponge buff-

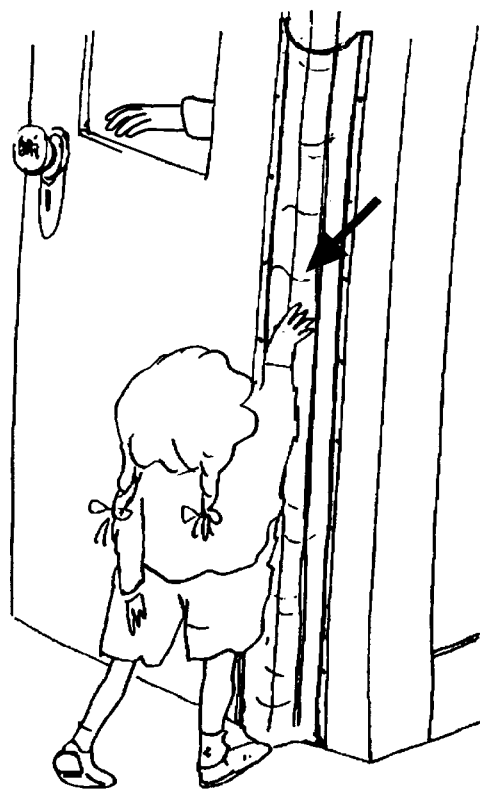


Figure 3 Australian plastic door guard at hinge side (arrowed).

ers can be fitted to the door on the lock and hinge sides so that the child cannot completely close the door. (3) A chain can be fitted to the wall beyond the reach of the child, hooked to the door, and kept opened. (4) A triangle shaped wooden, plastic (fig 2), or rubber stopper can be kept at the bottom of the door



Figure 1 Rubber stopper in door at lock side preventing crushing of fingers.



Figure 2 Triangle shaped plastic stopper at bottom of door preventing closure.

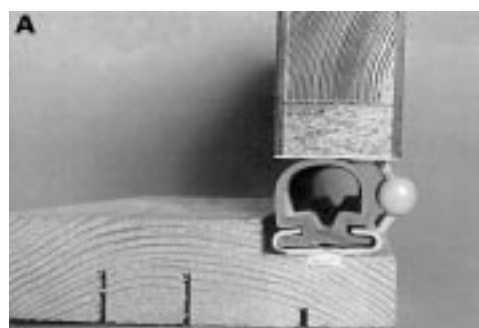


Figure 4 Danish "pinch free" door (A) and the fingers jamming during closing (B). The rubber yields so that the finger is not crushed between the wooden parts of the door, preventing or reducing damage to the fingers.

prevent the child closing the door. Adults can remove the stoppers whenever the door has to be closed or locked. All these measures are inexpensive.<sup>2</sup>

I(B) *Doors kept open, no access to the closing surfaces of hinge side*—in Australia an inexpensive covering device made of plastic is fitted on the hinge side of the door and frame (personal communication) (fig 3).<sup>2</sup>

II(A) *Door closeable, protection of opposing surfaces*—(1) A sponge or rubber can be fitted on either side of the opposing surfaces of the door and the frame on both the hinge and lock sides. This may prevent or reduce the damage of fingers when the door is closed. (2) In Denmark 40 mm KLG FD30 “pinch free” doors (fig 4A) are used. A rubber seal on the edge yields to the pressure of a closing door when the fingers are kept between closing surfaces (fig 4B). This door unit complies with the requirement of building regulations (Denmark) for 30 minute fire resistance (unpublished data).

II(B) *Doors closeable, no access to the hinge side*—a metal hinge can be fitted on either side of the opposing surface of the door and the frame on the hinge side, for the entire length of the door, so that there is no room for insertion of fingers. This may be expensive but is useful in any place where many children are moving around often, for example nurseries.

III *Other measures*—(1) Educating children and child carers of the problems about injuries in general, fingers in particular and protective measures, as outlined above, will reduce the

incidents and help prevent or reduce damage to the fingers. (2) Fire safety should also be considered whenever any changes are planned for redesigning, engineering, and environmental changes.

### Conclusion

Finger injuries are common in children, especially at the preschool age. Amputation can also be caused, with permanent shortening of digits. Injuries occur mostly in opposing surfaces of doors because of jamming or crushing and more often at home.

Preventive measures as outlined above, at home and in institutions where many children move around, will help to prevent or reduce damage to fingers, according to available resources. Fire safety regulations should also be considered before implementing any changes.

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1 Ozanne-Smith J. Child accident and injury prevention research in other than road accidents. Part 2: finger jam injuries to children in doors. (Monash University Accident Research Centre.) *Hazard* 1993;14:6.

2 Routley V. Victoria Injury Surveillance System: finger jam injuries from doors. *Hazard* 1995;25:9–10.

I would like to share this conversation from a recent meeting to promote farm accident awareness. The doctor speaking chose one of his patients from the audience and asked him to come forward.

“Tell us what happened to you Mr Jones” said the doctor.

“Well, Andrew was bringing me the small trees and I was putting them through the saw when I slipped”

“And you lost your fingers”

“Yep”

“Did you use a pusher for the trees?”

“Nope”

“Did you wear protective clothing?”

“Nope”

“Did you use a safety guard?”

“Nope”

“Have you learnt from this experience?”

“Yep”

“Will this accident happen again?”

“Nope”

“What precautions have you taken to ensure that this won’t happen again Mr Jones?”

“I take the trees to Andrew and he pushes them through the saw”.

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