

## DISCUSSION

The results of the current study into 26 deaths of 0-14 year old children from falls in Victoria between 1989 and 2002 revealed that:

- 62% (n=16) were male;
- 42% aged 0-4 years (23% < 1 year and 19% 1-4 years); 27% aged 5-9 years; and 31% aged 10-14 years;
- 44% (n=11) occurred between 3:00-6:00 pm;
- 58% (n=15) occurred on weekends;
- 64% (n=17) occurred in the home;
- 46% (n=12) were engaged in leisure activities;
- 45% (n=9) of direct fall deaths occurred from a height between 1 and 3 metres; and
- ~70% (n=18) deaths resulted from a head injury.

In the context of all unintentional death, fatal falls were comparatively rare events, approximately two deaths per year. This finding is consistent with previous Australian literature by Steenkamp and Cripps (2001) who reported that deaths of children from falls consisted of 1.1% of unintentional fall deaths across all age groups in Australia between 1979 and 1998. Steenkamp and Cripps (2001) also reported that falls accounted for 2.3% of deaths from all external causes in children, making falls the sixth leading cause of death over the 20 year period. On average, this represented 11 deaths per year.

A review of the literature on non-fatal fall injury in the 0-14 year age group revealed that unintentional falls are the leading cause of emergency department presentations and hospital admissions in Victoria, Australia and in some overseas countries. Steenkamp and Cripps (2001) reported that falls accounted for 38% of hospital admissions for the years 1993/94 to 1997/98. This and other Australian research reported that non-fatal fall risk factors varied according to age and location. Similarly, the factors involved in the deaths in the current study differed according to the age of the child and the location of the incident. The following discussion will be structured according to age group and make comparisons with non-fatal injury.

### < 1 Year

Six (23%) of the 26 fall-related fatalities were of children aged less than one year, four males and two females. All six deaths occurred in the home, three at the child's usual place of residence and three at a residence the child was visiting. At the time of the incident the child was either sleeping or being cared for. In two of these cases the child was being formally cared for while their parents were at work.

All the falls were considered to be short distance, between same level and 1.6 metres. Four of the six deaths resulted directly from the fall where a severe head injury was sustained. In the remaining two cases the child fell and subsequently died from asphyxia.

The most common scenario amongst these cases (n=4) was that the child fell from a conventional bed or sofa where they were sleeping, on to the floor. This is illustrated in the following excerpt.

*I was aware that DECEASED was tired, SON was still up and crawling around on the floor so I decided to put DECEASED on*

*our bed in the main room. This was a common practise, I would place her on the bed and usually put a pillow to one or both sides. DECEASED was not what I would describe as an active baby, I had never seen her roll and she was just beginning to sit up, it was about her third week, she could sit upright but you had to help her. I had placed DECEASED on the bed so I could watch her whilst I did the washing, that is, folding the clothes in the bedroom. The washing was already in the room so I put DECEASED down. The pillow at the head of the bed was on a bit of a angle so I didn't move it's position. I placed her down, SON was in the hallway, I could hear him, the door was still open. I started to fold the washing and I heard two thumps. I quickly turned and saw DECEASED lying at the side of the bed.*  
[Babysitter's statement - 4606/1989]

It is important for infants to be placed in age appropriate sleeping devices to ensure they do not roll off adult sized beds or other furniture and on to the floor. The current study demonstrated that a relatively short fall can be fatal for infants and young children. This is not only related to the risk of a head injury but also asphyxia.

In one of the two remaining cases, the child fell backwards from a sitting position, and in the other the carer fell with the child in her arms.

These findings are consistent with the results of studies examining non-fatal fall injury. Ashby and Corbo's (2000) study, which examined product-related fall emergency department presentations for the period 1996 to June 1999, reported that<sup>5</sup>:

- 1,032 injuries involved conventional beds;
- 1,028 injuries involved tables / benches / counters; and
- 860 injuries involved nursery furniture.

Ashby and Corbo (2000) also reported that the most common injury sustained by < 1 year old children was intracranial head injury (17.3%), the most common location was the home and the majority of falls (84%) were low falls (i.e. same level). Given the limited information surrounding the circumstances of the non-fatal fall injury, it is unclear what factors determine injury severity / outcome in relation to head injury sustained by young children.

### **1-4 Years**

Five (19%) of the 26 fall-related fatalities were of children aged one to four years, four males and one female. All five deaths occurred at the child's own home. At the time of the incident the child was either being cared for or engaged in "play". All the falls were considered to be short distance, between same level and 1.18 metres. Three of the five deaths resulted directly from the fall where a severe head injury was sustained. Two of these children received a head injury when they were dropped by their carer, while the other child fell from the toilet, landing head first on a tiled floor. In the remaining two cases the child fell and subsequently died from asphyxia, one who inhaled a stone when he fell and the other who hung himself when he fell from a step ladder onto a rope swing.

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<sup>5</sup> These numbers include < 1 year old children and 1-4 year old children.

Unlike the < 1 year age group, there were few commonalities amongst the cases in the 1-4 year age group. Previous research findings on non-fatal fall injury in this age group reported that furniture (chairs, bunk beds, tables) and trampolines were common objects involved. Other non-fatal research grouped <1 and 1-4 years into a 0-4 years category and reported that such injury most often occurred in the home, were from low height and involved furniture. These findings are generally consistent with the findings of the current study for this age group.

### 5-9 Years

Seven (27%) of the 26 fall-related fatalities were of children aged five to nine years, three males and four females. Five of these deaths occurred in the home, all but one at the child's usual place of residence. One death occurred at a recreation area and the other death occurred at an industrial site. At the time of the incident these children were engaged in leisure / "play" (n=5), sport / active recreation (n=1) or other (n=1). These falls involved a variety of objects: trees (n=2); building / building components (n=3); child's product (slide - n=1); and ground surface (cliff - n=1). Five of the seven deaths resulted directly from the fall, four where a severe head injury was sustained and one where internal injuries were sustained. The two indirect fall cases involved a laceration and a head injury. Three of the seven falls were considered to be short distance, between 1 and 3.65 metres. In two cases fall height was 5 metres and 14.2 metres and in the remaining two cases, fall distance was not applicable.

These findings are not consistent with the results of studies examining non-fatal fall injury. Ashby and Corbo's (2000) findings on product-related fall emergency department presentations for the period 1996 to June 1999, reported that arm fractures were the most common injury sustained, which resulted from falls from bicycles, in-line / roller skating and playgroup equipment. It was also reported that falls in this age group often occur in the educational setting as well as in the home (Ashby & Corbo, 2000). The discrepancy between these findings is a result of the fatal falls occurring from greater heights, resulting in more severe injuries to the head and internal organs.

### 10-14 Years

Eight (31%) of the 26 fall-related fatalities were of children aged ten to 14 years, five males and three females. Only one death occurred in the home and the remaining seven occurred at a variety of locations, including: recreation area (n=2); sports / athletics area (n=1); school (n=1); industrial / construction (n=1); and other (beach rock formation - n=1). In nearly all these cases the child was either engaged in informal sport and recreation (n=2) or a leisure / "play" (n=5). In six of the eight cases, the child fell in excess of seven metres (up to 180 metres). The height of the fall and hard landing surface, including concrete, bitumen and ice, resulted in significant head and internal injuries.

A common scenario amongst these cases was that the child was engaged in informal recreation in public space in the company of other children. The carers of these children were not in the immediate vicinity, but were nearby and knew where the child was. This appears reasonable given the age of the children however, in some cases (n=5) the child engaged in behaviour that, in retrospect, could be considered "risky". This is illustrated in the following excerpts of these cases:

*Deceased and friend had climbed on the roof of the garage in order to close the door as neither could reach the open door, a type that I know as a "tilt-a-door". In their attempts to close the*

door, by hanging onto the parapet above the doorway and standing of the door itself, the wall had given way and as the children lost their grip and footing and fell to the ground, the brickwork fell on them. (0254/1992)

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I then saw DECEASED attempting to climb down the front of the rock where CHILD 1 and 2 had attempted a short time beforehand. I then said to DECEASED that it appeared dangerous and risky, but he then stated that he would show CHILD 1 and 2 how it was done. As I recall the front of the rock where DECEASED was attempting to climb down came out into another ledge. This ledge was about a metre or two from the edge. The ledge overlooked the cave and it appeared challenging. I estimated the ledge was about 7 metres from the ground at that time and about a metre and a half from the top. I remember looking down the rock face and seeing the rocks and rock pools and formed the opinion that it was far too dangerous. However, this did not seem to faze DECEASED and I saw him climb down to the ledge. I remember seeing DECEASED climb all the way down to this dangerous ledge and he appeared to be in complete control of himself. I estimate DECEASED stayed on this ledge for a minute or two before he started to make his way back up. As DECEASED started to make his way back up he started to appear a little uneasy. I then asked DECEASED if he was okay and he replied Yes. As DECEASED approached the top of the rock, I saw his left hand slip off a rock, he then appeared as though he did not know what to do, he appeared anxious and I knew he was then in trouble. I then saw DECEASED'S right hand give way and he gave a yell and I then saw him fall backwards to the ground. His head hit the ground against a rock. (Witness statement - 3156/1992)

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The deceased has climbed onto this shade cloth canopy and had been sliding down the slope of the canopy. Whilst attempting a final slide down the canopy the deceased fell through a slit that had developed in the shade cloth, adjacent to a seam. He fell onto a bitumen area below where he sustained head injuries. (Coroner's Finding - 3656/1997)

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The deceased and his two friends used a tree to climb the FACTORY wall. They looked around the factory grounds when the deceased found a ladder and used it to climb onto one of the factory roofs. The deceased had his helmet with him at the time and at some point the helmet fell onto another roof, that was lower than the roof the deceased was standing on. The deceased jumped and fell through the asbestos roof and landed heavily on the concrete floor. (Coroner's finding - 1678/2001)

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*The boys have climbed the trail to the feature known as "Hanging Rock". Access was via smaller accessible rocks that led to the larger rocks and the Hanging Rock itself. Once on these rocks the deceased began leaping from one rock to another. He was warned by the other boys that it was dangerous to do so but he continued to do this. The deceased has then jumped from one rock to another and the gap was too large. He has landed awkwardly and slipped backwards. The deceased has fallen and impacted upon the ground before bouncing onto the chain link fence and coming to rest with his neck against the steel post holding the chain fence. (Coroner's finding - 3867/2002)*

Like the 5-9 year age group, these findings were not consistent with the results of studies examining non-fatal fall injury of 10-14 year old children. Ashby and Corbo's (2000) findings, reported that sport was the most common activity in which fall related injury was sustained, and that such injury consisted of arm fractures, sprains or strains.

The results of the current study supported previous Australian research findings, in that fall injuries were rarely fatal compared to other causes of unintentional injury deaths. Despite this finding, when falls were fatal the factors that determined injury outcome were:

- the presence of a severe head injury;
- fall height;
- landing surface;
- age; and
- location.

From a prevention perspective, a review of the literature demonstrated that the focus of strategies should be on non-fatal fall injury given the frequency of emergency department presentations and hospital admissions. Authors noted a number of behavioural and environmental changes required to reduce these injuries and suggested a number of prevention strategies. Steenkamp and Cripps (2001) proposed the following action areas:

- furniture / nursery items (e.g. nursery furniture, beds, bunk beds, chairs, tables, and baby walkers);
- recreation / sports (e.g. small wheeled equipment, bicycles, play equipment, sport and sport activities);
- structural aspects of the environment (i.e. stairs and steps for 0-4 and 5-9 year olds); and
- other (i.e. falls from heights resulting in death)

Strategies identified by SIPP (2001) included:

- review legislation that impacts on the safety of children;
- improve and strengthen product and environmental design and standards;
- increase child safety awareness through promotion and educational activities;
- develop interventions targeted at children's stage of development;

- include child safety competencies in education and training of child care and education workforce;
- implement risk management strategies in care settings;
- respond to special needs communities such as rural and remote, indigenous, disable and culturally and linguistically diverse backgrounds
- improve knowledge in fall prevention and falls management training and education for those who work with children; and
- organisational changes in sport such as improved environments and modified rules.

Ashby and Corbo (2000) proposed the following strategies and tasks:

- promotion of best practice;
- review of legislation;
- increase child safety awareness; and
- ensure that child safety competencies are included in education and training of the childcare and education workforce.

The findings of the current study demonstrated that there were some similarities between fatal and non-fatal fall injury, particularly in the < 1 year age group. In these cases, the presence and severity of a head injury appeared to be the determining factor as to whether the child died. Although fall height and landing surface are important considerations, the body part the child landed on appeared to be an important factor. Infants and young children in particular are top heavy and their head is the area most likely to impact the ground first. For these young children, the focus should be on the prevention of head injury. There were cases in the current study when the child sustained a fatal injury from a fall while visiting a home that was not their usual place of residence. It is important to ensure that when an infant is in the care of another person, that the place has suitable facilities for a young child, particularly age appropriate furniture for sleeping. Adult beds and couches were also a common location of a fall for infants in their own home, therefore it is imperative that infants only sleep in age appropriate sleeping devices.

Prevention of fatal falls in older children is problematic as many deaths occurred in the context of informal recreation / play in the home and in public space. Play is essential for both physical and social development and placing restrictions on such activity could be detrimental. A common theme amongst these cases was an obvious fall height of greater than three metres, risk associated with the activity engaged in that lead to the fall and the absence of direct adult supervision. A number of these deaths resulted from falls from roofs, trees and rock formations where the child appeared to lack appreciation of the dangers associated with their activity. In some cases the potential for harm had been brought to the child's attention either at the time or previously by their carer. This is illustrated in the following excerpts.

*I had warned DECEASED before to be very careful and that if she fell she could hurt herself. She had really good balance and was really good on her feet so I wasn't too concerned about her being on the roof on that day. She said that she was going to check to see if there were any leaves in the spouting. [Father's statement - 1604/2001]*

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*Deceased used to regularly play with the other children, on 3 or 4 occasions I saw deceased playing in the tree and she was sitting near the fence of the property. On the times I saw her she was sitting in the same spot and I would tell her to get down. .*  
[Mother's statement - 2578/2001]

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*It was at this time I noticed BROTHER slip I then told him to "Come back now" He replied "I'm alright Dad." I then told him to "Come back now" but more forcefully. He gave no reply. When BROTHER slipped he was about 15 metres away from where I was at the viewing area, he was standing on the left of the creek. DECEASED left us and walked down to where BROTHER was and stood there watching BROTHER. At that stage I was more interested in BROTHER as he had slipped. I felt DECEASED was safe where she was. The next thing I heard was BROTHER screaming out, "Dad, Dad, DECEASED'S gone over the falls" I cannot remember why not or what may have distracted me, it happened so quickly a matter of seconds.*  
[Fathers statement - 0164/1990]

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*DECEASED began leaping from one rock to another. He was warned by the other boys that it was dangerous to do so but he continued to do this. The deceased has then jumped from one rock to another and the gap was too large. He has landed awkwardly and slipped backwards.* [Police statement - 3867/2002]

Although there are developmental benefits to informal recreation and play, there are some activities, such as climbing onto roofs, that children should not be permitted to engage in. This relies on carers and parents of children restricting this kind of behaviour as it appears that children themselves do not have an appreciation of the dangers and consequences.

In addition, environments such as cliffs and rock formations with considerable descents, uneven terrain and hard landing surfaces are locations where there is a heightened risk of a fatal fall, particularly for older children. In most cases in the current study it appeared that children did not have sufficient appreciation of the dangers associated with activities such as jumping amongst rocks, climbing down cliff faces and over barriers to uneven and slippery surfaces. Carers of children therefore need to be made aware of these dangers and should ensure that in these environments children (even older children) are supervised. Carers should also ensure that children are made aware of the consequences of a fall from great heights. Literature on signage boards at national parks stating the presence of steep cliffs, ledges or rock faces may be an appropriate place to reiterate the risk of falls in these environments.

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