INJURY BULLETIN

Queensland Injury Surveillance Unit

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Injuries Related to Bunk Bed use in Queensland

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Summary:

* Bunk bed related injury accounted for 1% of all injury presenting to emergency departments in children aged 14 years and under.
* The main injury mechanism was a fall (85%) with most falls being a high fall over 1 metre (77%)
* Peak age group for injury was 5-9 years
* Children aged 1-4 years were more likely to be injured at play rather than during sleep.
* The most common body region injured was the head/ face (42% of bunk bed related injuries)
* Ceiling fans are an additional hazard in Queensland accounting for nearly 10% of bunk bed related injuries.

Introduction

Bunk beds are used as a space saving device both in residential homes and holiday accommodation. The risk associated with the use of bunk beds, particularly for young children, has been publicized in many countries. In an attempt to address the most serious hazards associated with bunk bed use, a mandatory Standard was introduced in Australia in 2002. This issue of the bulletin examines the pattern of injury associated with bunk bed use over the last 9 years in Queensland.

Method

The QISU database was searched for the nine year period, 1999 to 2007 for all emergency department presentations where the injury was identified as being associated with a bunk bed. Bunk beds are specifically coded as a major injury factor and a primary search was performed using this code. An additional cross check was performed by searching text descriptions for mention of "bunk". Cases where the injury occurred during the assembly or dismantling of the bunk bed were excluded.

Death data was accessed through the National Coronial Information System (NCIS) (1).

QISU collects and analyses data from emergency department injury presentations on behalf of Queensland Health. Participating hospitals represent three distinct areas of Queensland.

QISU publications and data are available on request for research, prevention and education activities.

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Results

QISU Data

There were a total of 1020 bunk bed related injuries in the 9 years from 1999 to 2007 (excludes injuries associated with assembling or dismantling the bunk bed). This represents 113 injury presentations per year due to bunk beds. QISU data is collected by hospitals representing approximately one quarter of the state population. Therefore, we estimate that there are 450 bunk bed related injury presentations to emergency departments annually in QLD.

Death Data

Searching the NCIS database revealed 2 cases of deaths in Queensland associated with bunk beds. One death was of a 2 year old who asphyxiated after getting her head trapped in the railing in 2002. The bunk bed was in a caravan and as such is not covered under the current Australian/ mandatory standards. The other death was of a 10 year old girl who fell from a free standing bunk bed and struck her head, again in 2002. The bed in question had no protective rail. Coronial findings in this case were released on the 12/09/2008 and have been included in the discussion of this bulletin.

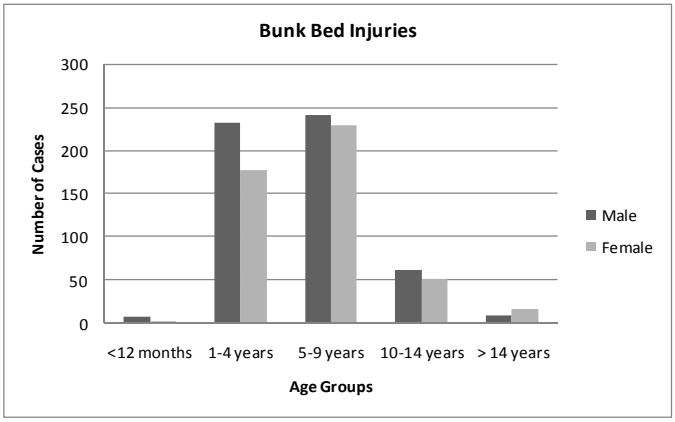
Location

The majority of bunk bed related injuries (969 or 95%) occurred in a private home. Twenty (2%) occurred in resort/ hotel/ hostel accommodation, 13 in dormitory accommodation and 9 in mobile homes/ caravans. In 8 cases the location was not specified and in one case the injury occurred in the shop.

Age and Gender

The majority (997 or 98%) of bunk bed injury presentations were for children 14 years or younger. Bunk bed related injury accounts for 1% of all injuries in children aged 14 years and younger. During the study period, there were 3216 presentations with injuries related to conventional beds in children aged 14 years and younger. Further relative risk calculation would require a survey of the number of families with children who use bunk beds versus normal beds.

With regard to bunk bed related injury, the peak age group for presentation is 5-9 years (469 or 46%) closely followed by children aged 1-4 years (408 or 40%). Peak age of presentation was 5 years (135 or 13%). Males presented slightly more frequently than females (54%). Nearly two thirds of all bunk bed injuries occurred to children 6 years or under (653 or 64%) and 932 presentations (91%) were for children 10 years or under.



Graph 1: Distribution of bunk bed related injuries according to age group and gender.

Mechanism

The predominant injury mechanism is a fall with 864 presentations (85%) after a fall from a bunk bed. Of these, 24 fell from the ladder and 35 were said to have been pulled or jumped from the top bunk.

In those injured by a fall, 787 were considered high falls (> 1 metre), known to be from the top bunk/ ladder. Of the 787 cases, 3 children rolled through (1 child, <12 months) or over the safety rail (2 children aged 1 and 5 years). In another 3 cases, children fell off the bunk and out a window (aged 2, 3 and 7 years).

A further 76 (7%) were injured following low falls <1m.

In 8 instances, injury resulted from bed collapse: 3 cases where the bed came apart and the top bunk landed on the child, 2 cases where the safety railing fell off and the child fell out (number included within high fall above), and 3 cases where the railing fell off and struck the child. In one instance where the bunk beds separated, this occurred because the child was lying on her back and pushed up against the upper bunk.

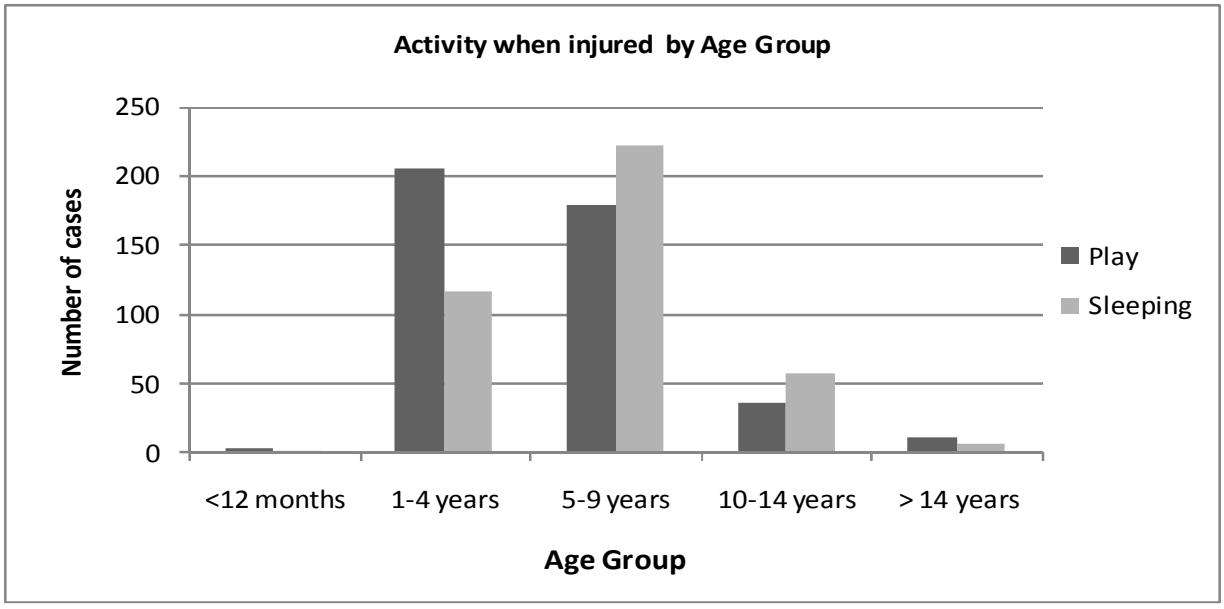
There were 97 presentations (9.5%) where the person was injured due to contact with a ceiling fan whilst sitting on/ getting off the top bunk. In the majority of cases, the ceiling fan struck the person on the head or face (88/ 97 or 91%). The most common injury was a laceration to the head/ face (81/97 or 84%). Of the remainder, 5 people sustained superficial injuries to the head/ face. One person sustained a concussion and another sustained a skull fracture. There were 5 upper limb lacerations, one lower limb laceration, one superficial upper limb injury and 2 upper limb fractures related to contact with a ceiling fan.

In 9 cases, children sustained lacerations from normal use of the bed; 6 due to contact with the bed, one due to contact with the ladder and 2 due to contact with a hanging picture/ window glass adjacent to the bunk.

In 45 cases, the injury was due to blunt contact with the bed post, bed head or under side of the top bunk.

Activity

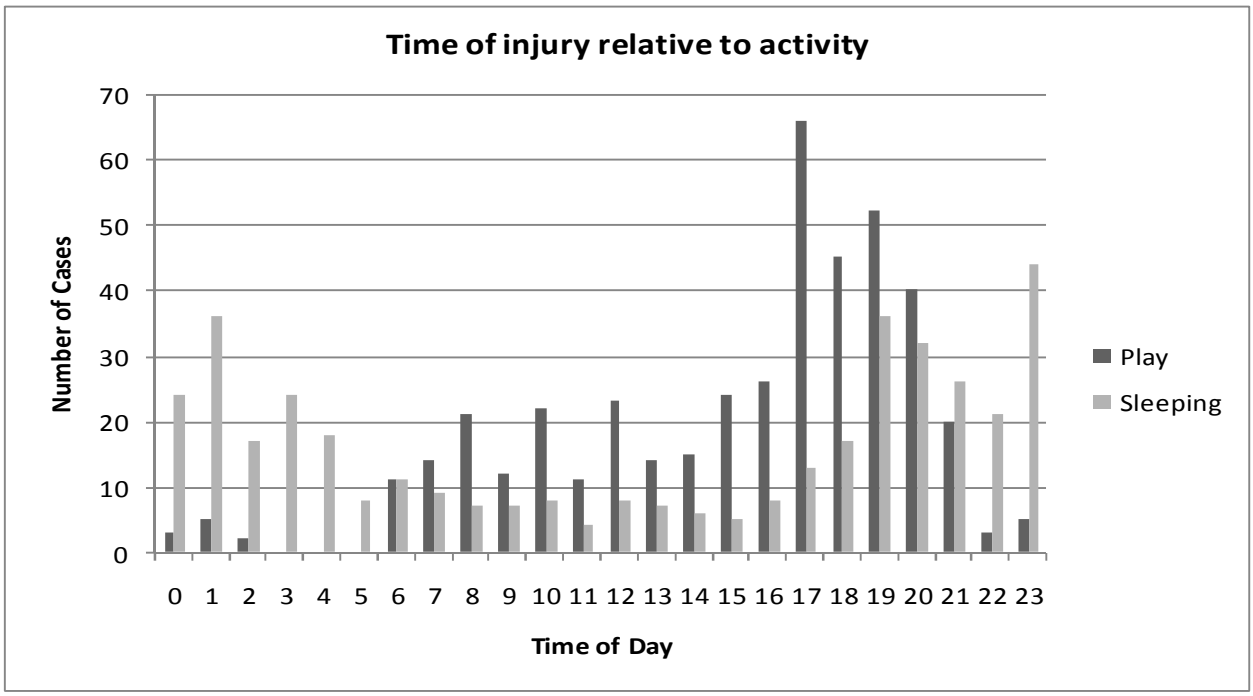
Specific activity could be identified for 841 of the 1020 presentations (82%). Of these, 407 were sleeping and 431 were playing/ climbing at the time of injury. A further 3 people were injured whilst making the bed (2 children aged 7 years and an adult aged 29 years). Play related injury was more common in the 1-4 year age group, peaking at 3 years of age. Sleep related injury was more common in the 5-9 year age group, peaking at 5 years of age.



Graph 2 Activity at the time of injury relative to age group.

Time of Injury

Injuries were more frequent in the evenings and on weekends, with 35% of injuries occurring between 5 and 8pm throughout the week and 35% of all injuries occurring on either a Saturday or a Sunday. There was variation in the activity according to the time of injury, with play related bunk bed injuries peaking at 5pm and sleep related injuries peaking at 11pm.



Graph 3: Time of injury relative to activity

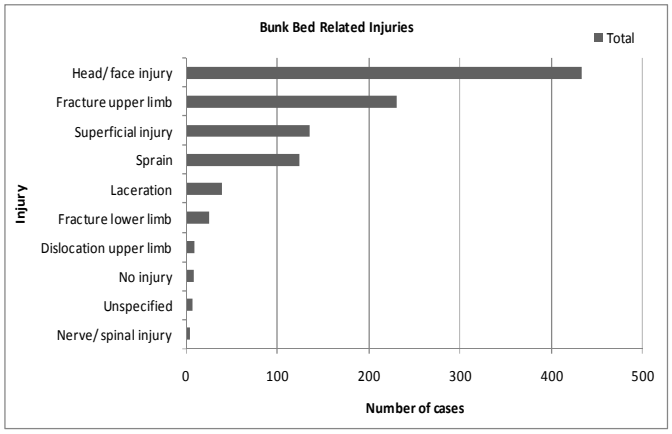
Injury

The most common body region injured was the head/ face with 433 presentations (42%). Presentations in this group were for lacerations (218), concussion (193), skull fractures (10), facial fractures (9) and intracranial bleeds (3).

Overall, a laceration was the most common type of injury with 257 presentations (218 to the head/ face and 39 to other body regions). Upper limb fracture was the next most common injury sustained (231 or 23%).

Of the remaining injuries there were 140 superficial injuries (14%) and 125 sprains (12%). Twenty five people sustained a fractured lower limb, 10 sustained a dislocation in the upper limb and one child sustained a detipped finger.

With regard to serious injuries there were 10 skull fractures, 3 intracranial bleeds (as mentioned above), 5 nerve/ spinal injuries and one abdominal injury.



Graph 4: Bunk bed related Injuries (n= 1018), Abdominal injury and detipped finger not represented.

Severity

Triage category is assigned on presentation at emergency departments and is allocated based on the age of the patient, mechanism and nature of injury. More severe/ life threatening injuries are allocated a triage category 1 and require immediate attention. On the other end of the scale, stable patients are allocated a triage score of 5 and are expected to be seen within 2 hours. Where triage category was recorded (1016), the majority of injury presentations were triage category 4 (593 or 58%). Fifty four presented as triage category 1 or 2 (5%). Injuries in this group included limb fractures (28) head/ face injuries (14) and spine/ nerve injury (1). Thirty one percent (317) presented as triage category 3 and 52 (5%) as triage category 5.

Overall, 208 people (20%) were admitted or transferred to another acute care facility for observation or management of their injuries. The majority of cases were discharged home (795 or 78%). Seventeen people left before being seen or after treatment commenced.

Discussion

The pattern of injury described in this bulletin is similar to reports in the international literature from the last 10 years. The most common injury mechanism associated with a bunk bed is a fall, representing 85% of injuries in this data series and between 72% and 93% of bunk bed injuries described in the literature. (2,3,4,5,6) The pattern of injury is also consistent, with head/neck/facial injuries predominating (42% in this series and between 23% and 51% in the literature). (2,3,4,5,6). Some authors report a higher risk of bunk bed related head injury with younger age. (2,4) In this series, head or face injury represented 50% of injuries in children aged less than 5 years, and only fell to 40% in those 5 years and over. Few other studies described injuries related to ceiling fans. This is likely due to climate variations in countries where studies have been carried out. One American surveillance study described 8% of bunk bed related injuries being due to ceiling fans (mostly lacerations to the head when sitting on the upper bunk). (4)

The hazard associated with having a bunk bed in the home has been likened to having a play fort in a child's bedroom. Whilst current playground Standards require adequate provision to prevent injury in the case of a fall ("Softfall", chip bark or sand in the fall zone), there is no such provision to protect children falling from bunk beds in the home. Few parents would sleep their child on the platform of a play fort, yet continue to sleep children in bunk beds purely because these elevated structures are sold as beds.

Estimates of the number of children exposed to bunks beds in the home and the number and age of children routinely sleeping on bunk beds varies.(3,5) The QISU series demonstrates that whilst the number of children aged 1-4 years and 5-9 years injured on bunk beds is similar, younger children were more often injured during play rather than sleep. This has been found in other series and likely reflects a tendency of parents to allow older children to sleep on bunk beds. This also highlights that parents need to consider potential misuse and misadventure during play when making a decision to purchase a bunk bed for the family.

An Australian Standard for bunk beds was first introduced in Australia in 1994 (7) following identification of bunk bed injuries in South Australia.(8) It was later

updated in 2003 to more accurately reflect current thinking about bunk bed safety.(9) The Australian Standard is a performance based standard that addresses a number of hazards including rolling out of the bed, head entrapment, snagging risk and stability of the bed and attachments. The current Standard requires a safety rail on all four sides of the upper bunk and describes use of a 95mm test probe to assess for head entrapment zones for any gap 600mm or more from the floor.

In 2002 as a result of the ongoing injury risk and the general lack of voluntary compliance by industry most governments in Australia mandated those parts of the Australian Standard that had the potential to reduce the injury risk. These included requirements for guardrails, safe gaps and the reduction of hanging hazards. (10). The mandatory standard does not cover bed stability (11) Bed collapse was associated with 8 injuries in this series. One other author has described a significant association between bed malfunction and increasing age.(2) Of the 3 cases in this series where the top bunk fell on the child, the children were aged 3, 7 and 8 years of age. The seven year old was described as having pushed upward on the top bunk with her feet.

The current Australian standard requires safety labeling that states "WARNING: TOP BUNKS ARE VERY DANGEROUS FOR CHILDREN UNDER 9". This warning label is not included in the mandatory standard. This data series and the international literature has shown that although the majority of bunk bed related injuries occur to children under the age of 6 years, a significant number of injuries occur in older children. (2,3,4,5,6) The Queensland Coroner in his report into the death of the 10 year old girl recommended:

> *….that the warning label on bunk beds as provided by the Australian Standard be reviewed by the Office of fair trading and other relevant authorities as soon as possible with a consideration that if there is to be a label for bunk beds it should not be age specific or at the very least increasing the age categories for the warning to up to age 14.* (12)

Another aspect of this case was that the family was staying in holiday accommodation. In the QISU series, more than 95% of all bunk bed injuries occurred in the home. Recognising this, the Coroner also recommended:

> *…..that the working party set up to consider the feasibility of establishing and promoting government funded programmes focussing on removing unsafe bunk beds from private residences proceed to completing its deliberations as soon as possible and the outcome be made public.*(12)

This is also an acknowledgement of the fact that despite the introduction of a voluntary Australian Standard for bunk beds in 1994 and a mandatory standard in 2002, unsafe bunk beds remain in use. In this regard, families in furnished rental accommodation (either short term holiday accommodation or long term accommodation) are at a disadvantage when they are not able to select safe sleeping options for children. It is anticipated that broadening of the bunk bed warning recommendations from "TOP BUNKS ARE VERY DANGEROUS FOR CHILDREN UNDER 9" to a general warning may prompt landlords and accommodation providers to review the risks associated with bunk bed use and as a minimum, comply with the current mandatory standard. In addition, accommodation providers should be obliged to inform potential renters when sleeping provisions include bunk beds.

The process in Australia for the recall of bunk beds involves either identification by inspectors of a breach of the mandatory standard either at point of import or point of sale, or identification of an injury where the product has failed or been found to breach the mandatory standard. To date, bunk bed recalls in Australia have been due to inspectors identifying products that fail the mandatory standard. (13) In the US, 2 recalls were associated with injury following bunk bed collapse. (14,15)

Summary

Bunk beds are inherently dangerous with injuries occurring both due to intended and unintended use. Parents considering purchasing a bunk bed are advised to:

* Purchase a bunk bed that complies with the current Australian Standard. Where this is not possible the bed should as a MINIMUM comply with the current mandatory Standard (report any incidence where they don't comply to the Office of Fair Trading on 07 330 59614 or 13 13 04 (if outside Brisbane))
* Not purchase or use a bunk bed for rooms containing ceiling fans
* Ensure that children do not play on bunk beds.

* Closely consider a safer alternative such as single beds but if space is at a premium and bunk beds must be used then never allow children under the age of 10 years to sleep on the upper bunk.

Recommendations

- That the current mandatory and Australian standards be expanded to include a general warning that bunk beds are hazardous regardless of age and that bunk beds should be made so as not to promote a play area in the top bunk (such as a fort)
- That the current mandatory standard be brought in line with the Australian standard requirements for stability and durability testing
- That accommodation providers be informed of the inherent risk associated with bunk bed use
- That a voluntary process be developed to remove unsafe bunk beds from private homes and rental/ accommodation settings
- That an injury surveillance system be developed to identify consumer product safety issues in Australia
- That community safety programmes be developed and evaluated to promote awareness of bunk bed hazards

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