

INJURY BULLETIN

Queensland Injury Surveillance Unit

No 91 May 2006

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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Bathroom Injuries in Queensland

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Summary Points:

- ◆ The bathroom is a common site of injury (at least 3700/year in Queensland).
- ◆ Children and older people are most at risk of bathroom injury; over 40% of bathroom injuries occur to young children (age <5 years).
- ◆ Causes of young children's' bathroom injuries include falls (47%), poisonings (18%), finger jam injuries (7%) and burns (6%).
- ◆ Older people are generally injured in the bathroom by falling (79%). Injuries to head/face and limbs are common with over a third (37%) requiring hospital admission.
- ◆ Bathrooms can be made safer by using non-slip surfaces/stickers/mats, grab-rails, reduction of hot tap water temperature and secure storage for medications and chemicals.
- ◆ Adult supervision is essential when children under 5 are in the bathroom.
- ◆ For older people bathroom hazards should be identified and modified before a fall occurs.

Introduction:

Unintentional injury occurs frequently in the home¹. Bathroom injury has not been previously described in detail, although in previous bulletins QISU has described some unintentional injuries that occur in the bathroom – burns and scalds, falls and poisoning^{2,3,4}.

This bulletin describes injuries to all age groups that occur in the bathroom and discusses the prevention of these injuries.

Methods:

QISU collects data from Queensland hospital Emergency Departments that cover a quarter of the population with approximately 80% ascertainment. Therefore QISU data represents about

20% of Queensland's total injury burden.

Data for this bulletin was gathered by searching QISU database for injuries occurring in the bathroom for the eight year period from January 1998 to December 2005.

The database was searched for any injury that occurred in the bathroom or toilet, at home or usual place of residence (including residential aged care facilities).

Results:

5895 bathroom injuries were identified over the 8 year period, approximately 740 injuries a year. This represents 4% of all injuries that occur in the home.

Age and Gender:

The majority of these injuries occurred in the 0 to 4 year age group with 2413 injuries representing 41% of the total. The next highest frequency of injury occurred in the 5 to 9 year age group, 637 injuries (11%).

552 injuries (9%) occurred to people aged greater than 65 years.

In childhood and early adulthood, similar numbers of females and males are injured. Beyond the age of 50 years, more injuries occurred to women, 606 of 919 injuries (66%) (see graph over).

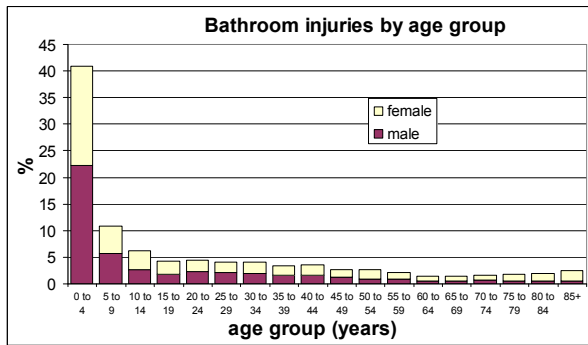
Time of injury:

Most bathroom injuries occur in the afternoon and evening, with 45% occurring between 5 and 9 pm.

Mechanism of Injury:

The most common mechanism of injury was a fall, resulting in 48% of injuries. Collisions with various items (often following a slip) were responsible for a further 15% of injuries. Ingestion of, or contact with chemicals and medications, was involved in 11% of injuries. Contact with sharp items including glass and razors caused 10% of injuries.





Nature of Injury:

Open wounds are the most common injury sustained in the bathroom (31%), followed by poisoning (10%), superficial injury (eg bruising, abrasion) (11%), sprain/strain (9%), intracranial injury (7%) and fractures (7%).

Body Region:

These injuries occurred mainly to the head and face (31%). Approximately 18% of injuries involved the upper limb, including 10% of injuries to the hand. Lower limb injuries occurred to 13% of cases.

Severity:

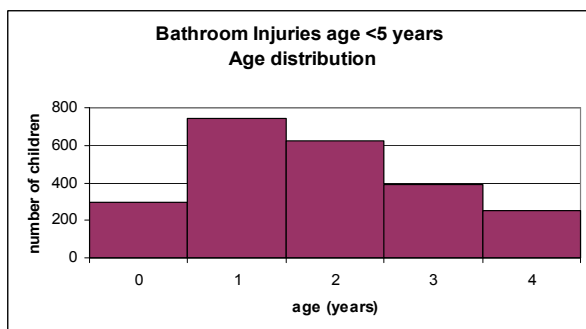
Thirty-two percent of patients were triaged as "urgent" or above (requiring treatment in 30 minutes or less) on arrival to the Emergency Department.

Approximately 16% of patients required admission to hospital.

Age < 5 years:

The 2413 children injured in the bathroom represent 5% of all injuries to children this age that occur in the home. Approximately 55% of these children were male.

The average age was 1 year and 10 months.



There has been little change in incidence of bathroom injury in < 5 year olds over the last 8 years. They occur at approximately 300/year.

These injuries mainly occur in the evening with 58% of injuries occurring between 4 and 8 pm.

Activity:

Most injuries occurred while bathing, toileting or being cared for, however 14% of injuries occurred to children who were playing in the bathroom.

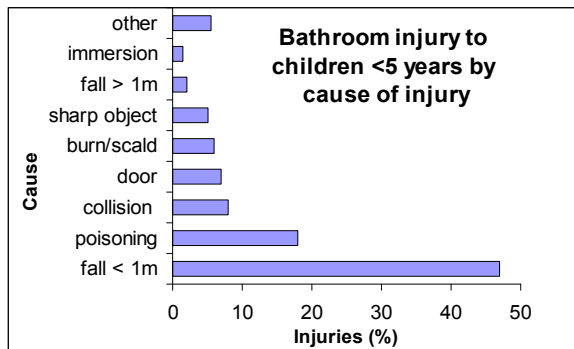
Severity:

Thirty-five percent of these injuries were triaged as "urgent" or above.

Admission to hospital was required in 409 cases (17%).

Causes of Injuries:

These are summarised in the graph



Falls of < 1m:

Most injuries (47% - 1126 children) in this age group resulted from a fall. The average age of these children was 1 year 11 months, and 55% were male.

Falls in or onto the bathtub or shower caused 55% of these injuries, while simply tripping or falling to the floor was the mechanism of injury in 11%. These injuries mainly occurred to the head and face (81%), with 8% occurring to perineum, 5% to the lower limb and 4% to the upper limb.

Injuries sustained were lacerations (50%), intracranial (18%), bruising and abrasions (15%) and fractures (3%). Ten percent of these patient were admitted.

The 191 children with intracranial injuries had an average age of 1 year 6 months, and 15% required admission.

The 79 perineal injuries occurred predominantly to girls (82%) and had an average age of 2 years 4 months. 12% of these patients required admission.

Poisoning:

Poisoning caused 430 (18%) injuries. This represents 10% of all poisonings in this age group (the 3rd most common place after the kitchen and bedroom). Males were injured in 52% of cases. These poisonings were 51% chemicals (mainly cleaning products and toiletry items), and 49% medications (including paracetamol 25%). These injuries were mainly oral ingestion of poison (67%), with 17% inhalation of poison and 16% external contact with poison.

Admission rates for these types of injury were 31% for ingestions, 43% for inhalation and 6% for contact.

Collision:

One hundred and ninety seven injuries (8%) were caused by collisions in the bathroom. These children had an average age of 2 years and 57% were male. These injuries were caused by collisions with walls, cabinetry and other fixtures (43%), collisions while in the bath or shower (38%) and collisions with other people (19%). Only 11% of these patients required admission.

Burns/Scald:

One hundred and fifty children (6%) sustained burns or scalds. This represents 7% of all burns and scalds in this age group, and 34% of tap water scalds. The average age of children who sustained burns/scalds was 1 year, with 75% being less than 2 years of age. The incidence of these injuries has not decreased

over the study period.

Almost all of these (97%) were caused by contact with hot water from a bath or shower tap. The affected body areas were 33% lower limb, 24% upper limb, 21% trunk, 7% perineum/buttocks.

Children with burns were triaged as urgent or above in 67% of cases and 43% of these children required admission.

Door:

Contact with a door caused 164 injuries (7%). Most of these injuries occurred to hand and fingers (76%). The injuries sustained were crush injuries (finger jam injuries), open wounds and fractures. 16% of these patients required admission including 9 traumatic amputations.

Fall > 1m:

Falling more than 1m resulted in injury to 45 children, with an average age of 10 months. 27% of these children required admission. Falling from a change table was the mechanism of injury in 64% of these injuries.

Twenty four children (54%) sustained intracranial injuries, with a further 29% being other injuries to the head and face.

The average age of the intracranial injuries was younger (4 months) and 26% of these children required admission. Falling from a change table caused 63% of these injuries.

Immersions:

Immersions occurred to 34 children. This represents 19% of all immersions in this age group (2nd only to swimming pools). The average age of these children was 6 months, with 74% younger than 12 months. All of these injuries occurred in the bath.

We do not collect data on the level of supervision present when these immersions occurred.

Three immersions occurred while an older sibling was present in the bath, 2 immersions followed a parent placing the child in the bath to reduce fever and one immersion was related to bath seat usage.

Almost all of these children were triaged as urgent or above (91%) and the majority of these patients required admission (68%).

Plug Hole:

Thirteen children were injured when fingers or toes became stuck in the bath plug hole.

Age > 64 years:

9% (552) of those injured in bathrooms were older than 64 years of age.

In this age group, more women (68%) than men were injured. Bathroom injuries in this age group occurred most commonly between 8 and 9am and between 5 and 8pm.

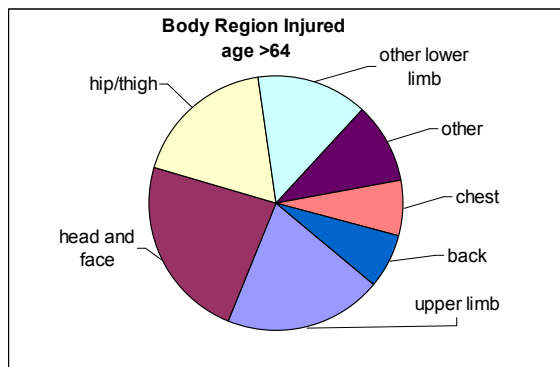
79% of these injuries occurred following a fall.

Activity:

The majority of injuries occurred while the person was engaged in 'personal activities' like showering or transferring from a bath or toilet to a walker (96%). Four percent of injuries occurred while the person was engaged in housework.

Body Region:

Head and face injuries were sustained by 23%, upper limb injuries 20%, injuries to pelvis, hip and thigh 18% and other lower limb injuries in 14% of cases.



Severity:

39% of these injuries were triaged as urgent or above. Overall, 37% of these patients required admission to hospital. The majority (74%) of patients with a hip injury required admission, while 21% of those with an injury to the head were admitted.

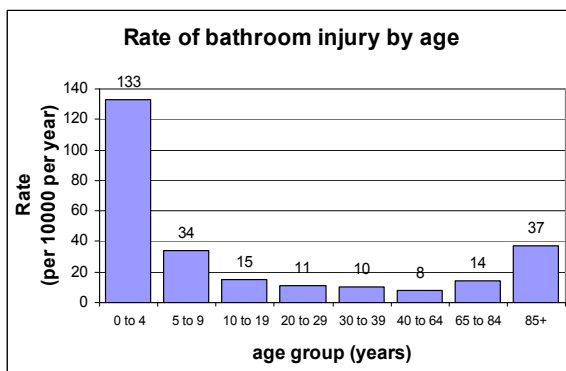
Residential Aged Care Facilities:

Fifty-eight (11%) older people were injured in residential facilities. These patients were 73% female. Falling was the main mechanism of injury (98%). A head and face injury was sustained in 27% and a hip injury in 25%. Forty nine percent of these patients required admission to hospital.

Discussion:

We estimate that every year approximately 3700 Queenslanders require Emergency Department (ED) treatment for injuries sustained in their bathrooms. Every day, at least 10 Queenslanders require ED treatment for a bathroom injury, including 3 to 4 people falling in their bathroom.

Using current population estimates ⁵ this is around 20 bathroom injuries per 10000 people per year for the whole Queensland population.



We estimate that bathroom injuries result in over 590 admissions to Queensland hospitals every year.

The number of bathroom injuries sustained in Queensland is likely to be higher than these estimates. Many injuries are likely to be managed in the community, not presenting to the Emergency Department. In the United States it has been estimated that a further 25% of home injuries are managed in the community ¹.

There are no comparable reports of bathroom injury in Australia or Internationally.

The age distribution (high in childhood and increasing again in older people) reflects both greater time spent in the home and greater risk of bathroom injury.

Older people typically have greater difficulties with mobility, vision and balance making them more likely to fall or slip. The bathroom is particularly dangerous in this regard because it is often a small space, has slippery surfaces worsened by the presence of water, and is often used at night.

The older population has a greater proportion of females and the greater number of female older people injured probably reflects this.

Children are much more active in and around the bath (causing falls, collisions and door injuries), explore dangerous items (causing poisoning, burns, cuts and immersions) and have less control over their environment (causing falls, burns and immersions).

The timing of these bathroom injuries (afternoon and evening) probably reflects the period of greatest bathroom usage.

Injuries in children less than 5 years old:

The bathroom is a common location for injury in this age group. The bathroom contains a wide range of potential hazards for young children, including the risk of immersion in the bath, burns from hot tap water, falls as a result of wet slippery surfaces, change tables, availability of cleaning products and medications and the presence of sharp personal items (eg shavers).

Falls of less than 1 metre are common in the bathroom because of the presence of water, slippery surfaces (bath and floor) and common child behaviours (climbing in and out of the bath, moving rapidly, moving often). The vast majority of these injuries occur to the head, face and neck because children have relatively large heads and bathrooms are often confined spaces with hard surfaces and sharp edges.

Perineal injury was also common. Perineal injury in children in the bathroom is usually caused by straddle injury on exiting or entering the bath, or when children sit on bath toys. The much greater proportion of females presenting to ED with perineal injury is unlikely to reflect a greater injury incidence. Perineal injuries to girls are more likely to result in bleeding, and cause greater parental anxiety.

Falls of greater than 1m in the bathroom are a potentially more serious mechanism of injury⁶. These falls occurred almost exclusively to children less than a year of age, usually when children are placed in a high position by an adult caregiver eg on a change table. Children older than 3 months can roll off change tables, but even younger babies may have the ability to 'wriggle' enough to result in a fall.

Poisoning remains a common cause of childhood injury – the 2nd most common cause of presentation and admission in children under 5 years⁴. Over 90% of these poisonings occur in the home, and the bathroom is the 3rd most common place these occur. The bathroom potentially contains both cleaning products and medication and in our study children were commonly poisoned by ingesting medication or ingesting, inhaling or being exposed to cleaning products (eye, skin).

Burns to children in the bathroom are almost exclusively hot tap water burns. These injuries are very painful and distressing (67% triaged as urgent or above), often required hospital admission (43%) and

have the potential for long term scarring. This issue has been discussed in detail in a recent QISU bulletin². Our data does not show a reduction in the incidence of these injuries, despite the change in Australian Standard for hot water delivery to the bathroom (required to be less than 50°C)⁷ and a previous public awareness campaign ("Hot Water Burns Like Fire"). The change to the Standard is recent and only applies to new and renovated houses, further time is required to fully evaluate the impact of this.

There were no fatal immersions in our ED data set but the 34 immersions seen had a high admission rate (68%) and the narrative information suggest that many of these children required CPR at scene.

Bathroom immersions can be fatal. In Queensland in the 13 years from 1991 to 2003, there were 29 bathtub fatalities and 12 fatalities in containers of liquid over this period⁸.

These fatalities are often not captured by ED data collection, as death frequently occurs at the scene of the immersion or much later in hospital. Fatal bathtub immersions do not just occur to very young children; a recent Queensland fatality was a 3 year old child⁸.

Door injuries to fingers are caused most commonly by a crush at either side of the door and can result in permanent finger damage. These injuries occur predominantly to young children⁹. The bathroom door is a particular risk area for these injuries, probably because children run in and out of this area and the door is frequently closed by older family members.

Injuries to Older People:

Our study shows that bathroom injuries, in particular falls, become more common as age increases beyond 65

years. We have previously shown that fall injuries comprise 60% of all injury presentations in older people (65 and older)³. One in three people 65 years and over living in the community fall each year, with approximately 50% of nursing home residents falling in a year¹⁰.

Older people fall for a number of reasons, some environmental and some personal. Some contributing personal factors include acute illness, wandering behaviour, cognitive impairment, blood pressure drops, reduced lower extremity strength or balance, unsteady gait, antidepressant medication and multiple medications¹⁰.

Environmental factors include flooring, lighting, footwear, grab rails and adequate walking areas.

The morbidity and mortality of falls in older people is very high. The 1 year mortality following a hip fracture is estimated to be at least 25%, and of the survivors around 60% have worsened mobility and 25% are likely to have persisting pain¹¹.

There is also further morbidity associated with a loss of confidence following a fall in the home.

Other injuries sustained when older people fall result in high mortality and morbidity, but generally of less magnitude than hip fractures.

We estimate that every year at least 10 older people in Queensland will die from falls in their bathrooms. It is clear that prevention of these bathroom injuries in older people will both save lives and improve quality of life.



Prevention:

Bathroom Design:

- ◆ Slip resistant surfaces should be used in wet areas¹².
- ◆ Install hobless showers to prevent trips.
- ◆ Non-slip appliques should be applied to baths and showers.
- ◆ The hot tap water temperature should be set to a maximum of 50°C. This is now legally required in bathrooms of new or renovated houses⁷. Ideally this temperature should be used for all outlets in the house using a tempering valve. Alternatively, individual tap regulators can be purchased for the bath for around \$30. These are available from hardware stores and online retailers and can be easily installed by parents.
- ◆ Lockable cupboards should be included in bathrooms to provide safe storage for medication and chemicals.

Older People:

- ◆ There are a number of detailed programs for preventing falls in older people and minimising injury from these falls¹³. These programs include exercise training, balance training, osteoporosis prevention and treatment, medication awareness, footwear, mobility aids, protective devices, professional home hazard assessment and home hazard modification.
- ◆ Queensland Health has coordinated a "Statewide Action Plan: Falls Prevention in Older People 2002-2006", which is a framework for action to reduce falls and their consequences in older people¹⁴.
- ◆ Important aspects of home modification include appropriately positioned grab rails and bars, good lighting (including night lighting) non-slip surfaces and adequate walking areas without tripping hazards.
- ◆ These modifications should be made early – before a fall has occurred. The fear of falling is a risk factor for older peoples falls¹⁴.
- ◆ If there is uncertainty about how to make the bathroom safe then a home visit from a professional (eg Occupational Therapist or community nurse) would be appropriate. Older people should discuss falls prevention with their family doctor, physiotherapist, other health professional or a Home and Community Care (HACC) Program provider (The HACC is a joint Commonwealth, State and Territory initiative that funds maintenance and support services to help frail older people and younger people with disabilities continue to live in the community).
- ◆ Further information on falls prevention programs for older people are available from <http://www.health.qld.gov.au/fallsprevention>

Young Children:

Young children (under 5 years) should not be present in the bathroom unsupervised at any time. However even with supervision, some bathroom injuries can occur. In a recent survey of bath related injuries, 85% of parents reported direct adult supervision at the time bathtub injury occurred¹⁵. This suggests that both supervision and

environmental modification will be required to prevent these injuries.

Falls:

- ◆ A suction mat (\$6) or non-slip stickers (\$5) should be used on the bottom of the bath and shower.
- ◆ Bath time should be fun, but children should be taught to sit while in the bath.
- ◆ A bath mat should be used to absorb inevitable water splashes, reducing slips and falls.
- ◆ Nappy change tables are a falls risk. Careful consideration should be given to whether one is necessary; there are safer alternatives eg the floor or the middle of a bed. If one is to be used it should be of solid construction, with barriers and have a waist belt. The waist belt should be used every time.
- ◆ Set up with everything needed before starting to change the baby. Never leave a baby alone on a change table, always keep one hand on your baby.

Poisoning:

Household Chemicals:

- ◆ Keep household chemicals like cleaners, detergents, bleaches in a secure place. They should be out of reach, in a locked cupboard.
- ◆ Carefully read the warning labels on products and purchase products with a Child Resistant Closure.
- ◆ Keep all chemicals in their original containers.

Medications:

- ◆ Keep medication out of reach; ideally in an out of reach, locked cupboard.
- ◆ Try not to take medication in front of children (to make it less likely they will attempt to mimic this behaviour).
- ◆ Grandparents, other carers and other visitors may have dangerous substances accessible to children. Ensure visitors are aware of this danger and keep their medication safely out of children's reach.



Herbal Products, Essential Oils:

- ◆ Iron tablets and other "natural" products eg vitamins can be highly dangerous. Similarly essential oils are potentially very toxic to children either inhaled or ingested. As little as 5 mls of eucalyptus oil can cause coma and even death. These products should be stored as safely as medications.

Water Safety:

In and around the Bath:

- ◆ Bath supervision is vitally important. To ensure this occurs, try to choose a bath time with less potential distractions and take the phone off the hook or take the phone to the bathroom if necessary.
- ◆ If supervision is interrupted, the child should be removed from the bath and taken with the caregiver.
- ◆ Children up to the age of 5 years should have direct adult supervision when in the bath. Older children are unable to supervise younger children in the bath as they will never appreciate the true risk and cannot be relied upon to deputise for the responsible adult.
- ◆ Baby bath seats have been associated with bathtub drowning. They can give adults a false sense of security as they are not a safety device. If a bath seat needs to be used, adult contact should still be maintained at all times.

- ◆ Keep the bath plug out of reach so children can't fill the bath themselves.
- ◆ Children with a fever should not be placed in a bath full of water. Providing cooling by tepid sponging is much safer and just as effective.

Other Water Hazards:

- ◆ Buckets of water (eg soaking washing) should be kept up high eg in the laundry tub, should have a lid and be kept behind closed doors.
- ◆ Keep the toilet lid down with the door closed if possible. Consider a toilet latching device.

Door Jam injuries:

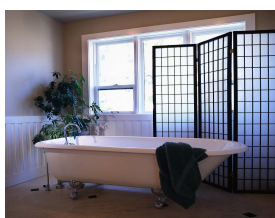
- ◆ Special strips are available, to guard the hinge side of doors. These are very useful for doors which need to be closed, such as bathroom and bedroom doors.
- ◆ Chocks, wedges or catches or slow, self-closing springs can also be used to keep internal doors from slamming shut.
- ◆ Older children and adults should be educated about the potential for these injuries and taught to check the door is clear before they close it.

Burns:

- ◆ Ensure hot tap water is a maximum temperature of 50°C (see 'Bathroom Design').
- ◆ Always run the cold tap first in bath and then add hot water while testing the temperature.
- ◆ Turn the hot tap off first and finish with cold water to avoid hot drips and a hot faucet.
- ◆ Check water temperature (using wrist or elbow) before putting children in the bath.

Recommendations:

- ◆ **Safety should be a key element of bathroom design including slip/trip reduction, lockable cupboards and reduced water temperature.**
- ◆ **Non-slip products should be used in the bath and shower to prevent falls**
- ◆ **Bath tap water temperature needs to be reduced to less than 50°. If a tempering valve is not installed then a tap regulator should be used on the bath tap.**
- ◆ **Medication (including herbal products and vitamins), cleaning products and toiletry items need to be stored securely – locked away is best.**
- ◆ **Finger jam injuries can be prevented by door strips, chocks or wedges**
- ◆ **Children under 5 years require adult supervision when in the bathroom.**
- ◆ **The prevention of falls in older people needs to be attended to before a fall occurs; professional assistance is readily available through organisations such as Queensland Health.**



Resources/Links:

- ◆ Kidsafe: <http://www.kidsafensw.org/homesafety/>
- ◆ Smart Housing: <http://www.housing.qld.gov.au/initiatives/smarthousing/index.htm>
- ◆ Queensland Safe Communities Support Centre: <http://www.safecommunitiesqld.org>
- ◆ Queensland Health Falls Prevention website: <http://www.health.qld.gov.au/fallsprevention/>
- ◆ Safer Homes for Older People – Postcard <http://www.health.qld.gov.au/phs/documents/shpu/30291.pdf>
- ◆ HACC services can be contacted through Commonwealth Carelink Centre on 1800 052 222 or www.health.qld.gov.au/hacc

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