INJURY BULLETIN

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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Queensland Injury Surveillance Unit

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Envenomation

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SUMMARY POINTS:

- Envenomations account for an estimated 2.5% of all emergency department injury presentations in Queensland
- Most envenomations occur around the home or in the garden
- 45% of envenomations occur in children
- The majority (27%) of ED presentations for envenomation are due to spider bites
- 60% of patients presenting with snakebite required admission
- Death and serious sequelae can be prevented in almost all cases by appropriate first aid and rapid attendance to a health care provider

INTRODUCTION

Every year many Australians present to general practitioners and emergency departments across the country having been bitten or stung by a venomous insect or animal. The majority of these cases are mild and require no further management beyond basic advice and reassurance. In Queensland, the spectrum of envenomation is varied. There is a great diversity of habitat ranging from arid desert to tropical rainforest and marine environments. Queensland's insects and animals are amongst the most venomous in the world, yet only a small proportion of emergency presentations are due to envenomations and very few are fatal.

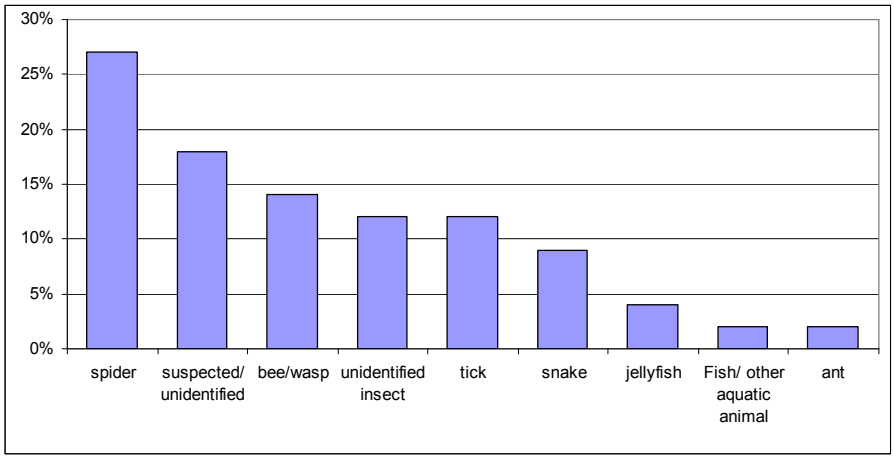
METHOD

Data for this bulletin were gathered from the QISU database by searching for envenomations occurring in the eight year period from January 1998 to December 2005. During this period QISU collected data from Queensland Hospital Emergency Departments (ED) covering a quarter of the population with approximately 80% ascertainment. People that died prior to arrival at an ED are not included in this data. Death data were accessed from the Australian Bureau of Statistics (ABS) death collection database for the three year period 2000 to 2002 and from the National Coronial Information System (NCIS) for the period 2001 to 2006.

OVERVIEW OF THE DATA

A total of 7981 patients presented from January 1998 to December 2005 to a QISU participating ED following an envenomation. The majority of patients were male (4687, 58%) and 3760 (47%) were children under the age of 14 years. A breakdown of the types of envenomations is shown in table 1.

Table 1.Percentage of emergency envenomation presentations due to different animals



The most common organisms involved were spiders, accounting for 27% of all bites. Bee and wasp stings, unidentified insect bites and the large category of 'suspected / unidentified' envenomations contributed equally to the overall picture of envenomation. The latter were presentations where envenomation was suspected based on a localized skin injury, sensation of a possible bite or generalized symptoms, but where no insect or animal was seen. More severe envenomations (snake bites and jellyfish stings) made up a smaller proportion of the total (6% and 4% respectively).

REGIONAL VARIATION

Table 2 shows the distribution of various envenomations as recorded in three different regions within Queensland. Envenomations due to box jellyfish are uncommon south of Bundaberg[1]. All of the box jellyfish envenomations in our series were reported in the Mackay region (Mackay, Sarina, and Proserpine).

Table 2. Regional distribution of envenomation by type shown as % of ED presentations due to envenomation in each region.

	Mackay	Mt Isa	Sth BB
Spider	20%	25%	24%
Tick	7%	3%	10%
Fish	5%	1%	1%
Ant	1%	0%	2%
Bee/Wasp	15%	20%	11%
Jellyfish	10%	0%	1%
Snake	14%	9%	3%
Insect suspected	7%	19%	13%
Unidentified / suspected	21%	23%	35%

SEVERITY

Table 3 summarizes injury severity according to triage category, and the subsequent admission rate for respective envenomations. Injuries requiring resuscitation are rare, but chiefly occur in the setting of snake bite, box jellyfish or bee stings presentations. The majority of cases were triage categories 3 or 4, reflecting the benign nature of most envenomations. Snake bites have the highest admission rate (60%), followed by jellyfish stings (47%). Hospital admissions reflect serious cases, or involve other considerations such as distance from home, the age of the patient or need for observation for potential complications. Analyzing all admissions to hospital for envenomation, the vast majority relate to anaphylactic or anaphylactoid reactions, or cellulitis after a bite or sting.

There were 1114 admissions listed in the database. 723 (64%) were male. 520 (49%) were children under 14 years of age.

SPIDER BITES

There were a total of 2331 confirmed spider bites in our series (27% of all envenomations). Of these, 375 (54%) were male and 980 cases (42%) involved children under the age of 14 years. **Redback Spider** bites accounted for 686 cases (29%), while 23 (1%) were ascribed to a possible **White Tailed Spider**. Only one documented case of **Funnel Web Spider** bite was found. The rest were not identified.

One case was triaged as a category 1 patient (requiring resuscitation), after a redback bite to the knee. A further 227 cases (10%) were assigned category 2 status and 811 (35%) were Category 3. Of the 227 category 2

Table 3. Severity of injury at ED presentation according to triage score and type of envenomation.

Envenomation	Total	1	2	3	4	5	Unspecified	Admission
Spider	2331	1	227	811	1063	173	57	197 (9%)
Bee/wasp	1229	3	35	324	661	178	28	100 (7%)
Unidentified insect	986	1	19	178	660	117	11	54 (4%)
Tick	928	1	11	80	647	182	8	18 (2%)
Snake	718	15	318	317	51	7	8	432 (60%)
Jellyfish	301	2	299	0	0	0	0	140 (47%)
Ant	197	1	13	45	99	27	12	9 (6%)
Fish/marine animal	174	0	12	12	111	101	3	20 (9%)

patients, 184 (8%) were children under 14 years of age. Most of the adults triaged as category 3 presented with symptoms of severe pain, nausea, breathlessness, chest pain or suspected allergy reaction.
Only 197 patients (9%) required admission to hospital.
Most patients were bitten on the upper limb or lower limb. The majority (60%) of these occurred around the home and 28% in the home (12% occurred in the garage).

SNAKE BITES

There were 718 cases of documented snake bite in the database over the last 8 years. The majority (467 or 65%) of cases were male and 223 (31%) of these were children under 14 years. Most snake bite injury occurred around the home 639 (89%) with bites in the garden area most common (254 cases, 35%). The foot and lower limb were most often involved. 15 cases were triaged as a category 1; 11 of these were children. The rest were mostly category 2 or 3(635 or 88%). Admission rates were highest following envenomations due to snakebite with 60 % (432) of patients requiring admission to hospital. Identification of the snake at presentation to triage was not possible in the majority of patients.

BEE AND WASPS

During the study period, there were 1229 cases of envenomation by bees/ wasps. The majority (806 or 65%) of presenters were male, and (621 or 50%) were children under the age of 14. The majority occurred around the home 87% and 43% happened in the garden. Three cases were triage category 1 (requiring resuscitation) and presented with suspected anaphylaxis. A further 7 were described as 'anaphylaxis' at triage and classified as category 2, and 41 were described as having an allergic reaction following a bee/ wasp sting. A total of 100 (8%) cases were admitted to hospital. At least 15 patients identified in the database had had a previously documented episode of anaphylaxis following a bee/ wasp envenomation. None of these 15 patients had received adrenaline before arriving at the emergency department, despite a description of a further suspected anaphylaxis to a bee/ wasp envenomation.

TICK BITES

There were a total of 928 documented tick bites. The majority of presenters (534 or 58%) were males and 582 (63%) were children under the age of 14. Most patients were bitten on the face, head or neck area (52%). Tick bites were triaged mainly as category 4 or 5, reflecting the often benign nature of the bite. 1 child was triaged category 1 due to suspected anaphylaxis, while 8 other children were category 2 patients for the same reason. Only 18 cases (2% of all episodes) were admitted to hospital. 16 of these were children. These cases included cases with suspected symptoms of anaphylaxis, cellulitis after a tick bite,

and 3 cases related to worsening neurological symptoms possibly due to paralysis tick toxin.

OTHER INSECT BITES

Unidentified Insect Bites

This large category includes presentations due to envenomation by an unidentified insect. There were 986 (74%) presentations in this group, 518 (52%) were male and 756 (77%) were children under the age of 14.Only one of these was a triage category 1 case, involving a child of 3 yrs of age and a bite to the face. Nineteen (2%) cases were category 2 presentations, 16 of which involved children. All 19 patients had descriptions of generalized urticaria and or anaphylactic symptoms. Only 54 (5%) patients required admission to hospital. Most of the indications for admission related to symptoms of anaphylaxis, or cellulitis requiring antibiotic administration.
Trying to identify the type of insect involved was difficult as the database relies on description of the insect provided at triage.

Ant

There were 197 cases of suspected ant bites in our series. Almost half were male (87 or 46%), and 104 (55%) cases involved children under the age of 14. One patient presented as category 1, with symptoms of anaphylaxis, while 13 (7%) were triaged as category 2 for the same reason. Ant bites (as with most insect bites) largely affected the lower and upper limbs. Most bites (139 or 71%) occurred around the house, often in the yard or garden. Almost all patients (166 or 84%) were discharged directly from the Emergency department, with only 9 (5%) requiring admission. These admissions were chiefly for anaphylaxis, and cellulitis.

JELLYFISH

There have been a total of 301 documented jellyfish stings over the data capture period of 8 years. The majority of presenters (179 or 59%) were male and 120 (40%) were children under the age of 14 years. Two patients were registered as category 1, all other patients were category 2. Almost half of all victims of jellyfish stings required admission to hospital (47%). All cases in our series presented to emergency departments in the Mackay area (Mackay, Sarina, and Proserpine).

Unidentified jellyfish

The majority (247 or 82%) of jellyfish stings were unidentified. Most of these (87%) were reported in the Mackay region, 200 (81%) affected males and 105 (43%) affected children under 14. One patient presented as triage category 1, 246 presented as category 2. The majority (216 or 87%) of the 247 cases presented between December and April.

Irukandji


Irukandji

Of the 54 envenomations where the jellyfish were identified, 34 envenomations were attributed to the Irukandji jellyfish. All came from the Mackay region and 33 (97%) presented between December and April. Mostly males were affected (26 or 76%) and 5 (15%) affected children under the age of 14. One was triage category 1, 53 were triage category 2.
There was variation in the number of patients presenting each year (2 to 11 presentations) with Irukandji syndrome.

Bluebottles

Eight jelly fish envenomations were attributed to blue bottles. Five children under the age of 14 were affected, and 3 were male. Six were reported in the Mackay region and all occurred between December and April. All were category 2 patients.

Box jellyfish

Eleven stings were attributed to box jellyfish. All of those occurred between December and April, with five affected males. Five were children under the age of 14, and all came from the Mackay region. All box jellyfish envenomations presented as triage category 2.

FISH AND OTHER ACQUATIC ANIMALS

There were 174 cases of fish and other marine animal related envenomations recorded (catfish, stonefish, bullrout, and stingray). There were no definite octopus or cone shell envenomations in our series. Of the 174, 154 (89%) were male and 54 (23%) cases involved children under the age of 14. In many cases (60%), envenomation followed contact with an unseen/ unidentified fish or marine animal.

Twelve cases were triaged as category 2, most being related to severe pain from stepping onto stonefish. Most patients were subsequently discharged from emergency departments. Twenty patients required admission to hospital, most commonly for removal of a stonefish or catfish barb or sting which became embedded in a foot.

Catfish

One quarter (43) of injuries in this group were attributed to catfish. Of those, 41 were male (95%) and eight (19%) were children under 14 years. Most of these injuries occurred in the context of fishing (handling the fish once caught).

Stonefish

Thirty (18%) cases were attributed to stonefish injury, of those 5(17%) were under the age of 14 and 29 (97%) were male.

Bullrout

Bullrout stings accounted for 9 cases (5%), 4 (44%) were under the age of 14, and all were male.

Stingray

There were 31 cases (18%) of stingray related injury documented over 8 years. 23 (74%) were male, 3 (10%) were under the age of 14. None of these cases were triaged as life threatening or urgent (no category 1 or 2) and none required admission. Most injuries involved beachgoers walking along the shore, in the shallows or near rock pools where they inadvertently stepped onto a stingray and usually had minor lacerations to the lower limb or feet from the stingray's barb. A few cases involved fishermen handling stingrays as part of their work, but most were recreation related. All but 6 cases were recorded from the Mackay region.

Death data

Death data For Queensland were obtained from the ABS for the three year period of 2000 to 2002 and from the NCIS for the period 2001 to 2006. Envenomation is an infrequent cause of death with a total of eleven deaths recorded in the seven year period. Three deaths were due to snake bite. Four deaths were due to insect envenomations and three deaths from anaphylaxis associated with bee/ wasp/ tick envenomations. All of these were adult fatalities.

The remaining five deaths occurred in children less than 10 years of age. All were attributed to marine envenomations (marine fish, jellyfish and unspecified marine envenomations). One death occurred following ingestion of a cooked toadfish, two occurred following box jellyfish stings and the remaining two were due to unspecified marine envenomations.

Discussion:

Envenomations are a frequent cause for presentation to Queensland emergency departments. Whilst most envenomations are mild, some are painful and distressing and a few are potentially lethal.

Males predominate in our series (similar to previous studies). This is partly related to recreational or work activities (ie fishing) but may also relate to greater risk taking behavior. Overall children represented 45% of presentations with envenomation. Our data collects from two large Paediatric hospitals and this may affect the proportion of children in our series. However, children are more vulnerable to envenomation. They are less cautious and therefore more likely to approach venomous creatures. If bitten, because of size and body weight, they are more susceptible to the effects of venom.

Bites due to spiders, insects, bees and wasps make up the majority of presentations in our series. These insects are almost ubiquitous in our home environment, yet relatively few envenomations occur. With the exception of some specific spider toxidromes, morbidity associated with insect bites is largely due to anaphylaxis or cellulitis. Early use of adrenaline can ameliorate anaphylaxis symptoms and prevent death in most instances.

Potentially more serious envenomations due to snakes or jellyfish accounted for only 13% (1019) of presentations in our series. Although

Table 4: Envenomation deaths in QLD: 2000 to 2006. Paediatric deaths in bold/italic

	2000	2001	2002	2003	2004	2005	2006	Total
Snake		3						3
Tick		1						1
Jellyfish				*1*			*1*	2
Bee/ wasp	1				1			2
Fish			*1*					1
Marine	*1*		*1*					2
Total	2	5	2	1	1	0	1	11

snakes occur around the home, they are generally evasive in nature. However; some snake bite deaths have occurred following deliberate handling of the snake by inexperienced people[2]. Jellyfish populations along the coast vary with tide and season. Box and Irukandji jellyfish are translucent and very difficult to spot/ evade in the water. In summer months in endemic areas, stinger nets and stinger suits can reduce the hazard although small portions of tentacles can pass through the nets. Sightings of box jellyfish or prevailing tide and wind conditions likely to bring the jellyfish into shallow waters may prompt beach closure.

In general prevention strategies to reduce mortality and morbidity associated with envenomation include:

* avoidance of the animal
* recognition of envenomation symptoms
* timely and toxin specific first aid
* early definitive care in an emergency department

Despite the availability of antivenom for many envenomation syndromes, deaths still occur[3]. Several factors may be responsible for this (failure to recognize symptoms, delay to presenting to emergency health care, overwhelming envenomation or anaphylaxis).

Resources:

Detailed information regarding specific envenomations can be found on the Australian Venom Research Unit website at http://www.avru.org/

Urgent clinical information following a potential envenomation can be obtained by ringing the Poisons Information Centre on 13 11 26

http://www.health.qld.gov.au/PoisonsInformationCentre/default.asp

The Queensland Museum provides a 24 hour Spider Bite Emergency Line: phone 0412848467

Information on allergy and anaphylaxis can be found through the Australian Society of Clinical Immunology and Allergy website at: http://www.allergy.org.au/aer/infobulletins/index.htm#anaph

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Poisons Information Centre on 13 11 26

Sting pattern from Box Jellyfish