Poisoning and Envenomation

The Poison Information Centre – 13 11 26

Poisoning
Poisoning is one of the leading causes of injury to children under five, and common household chemicals, cleaners and medicines often poison children. But there has been a steady decline in the number of childhood deaths from poisoning due to the introduction of child resistant containers, effective treatment and possibly the use of more widespread less toxic substances and medications.

Recommended
- Use standard precautions in all poisoning cases where toxins unknown
- Do not undertake any gastrointestinal decontamination until a full risk assessment has been completed
- Consider poisoning in any child who is confused, drowsy, unconscious or fitting
- Remember that someone who is conscious and talking after taking a poison could still be in the early stages of severe poisoning

Identification – Signs and Symptoms
Recognition of poisoning may be obvious from the circumstances of the incident, but this is not always true. A child may complain of physical symptoms without realising these are due to a poison or it may be difficult to elicit this information from the child so history of the event may need to come from caregiver. Alternatively, they may exhibit abnormal behaviour, which may be misinterpreted as alcoholic confusion or psychiatric disturbance.
- Central nervous system depression e.g. confusion, drowsiness, altered level of consciousness or fitting
- Gastrointestinal tract toxicity e.g. nausea, vomiting
- Cardiovascular system toxicity e.g. hypotension, bradycardia or tachycardia, arrhythmias
Poisons may have a rapid effect, but their effects may also be delayed. Speed of effect is determined by the nature of the poison, its concentration, and the time of exposure.

Assessment

<table>
<thead>
<tr>
<th>Risk Assessment</th>
<th></th>
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</thead>
<tbody>
<tr>
<td><strong>Agent taken</strong></td>
<td>Name of product, its ingredients/components, manufacturer</td>
</tr>
<tr>
<td></td>
<td>Look for container if possible</td>
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<tr>
<td></td>
<td>Ask relatives or witnesses</td>
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<tr>
<td></td>
<td>Overdoses of drugs often involve more than one substance</td>
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<tr>
<td></td>
<td>Inquire specifically if alcohol has been taken in all instances as it may greatly affect the toxicity of other exposures</td>
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<tr>
<td></td>
<td>Also inquire specifically about paracetamol and any other over-the-counter products</td>
</tr>
<tr>
<td><strong>Route of exposure</strong></td>
<td>Oral, topical, eye, inhaled, injected</td>
</tr>
<tr>
<td><strong>Dose</strong></td>
<td>Try to work out exactly how much was taken; this may require manually counting out the amount remaining in the container from the amount initially thought to be there</td>
</tr>
<tr>
<td></td>
<td>It is important to always consider the worst case scenario</td>
</tr>
<tr>
<td><strong>Time of exposure</strong></td>
<td>Exact time if possible</td>
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</tbody>
</table>

Do not cause vomiting unless told to by Poisons Information Centre
### Risk Assessment

<table>
<thead>
<tr>
<th>Intent of exposure</th>
<th>Accidental or deliberate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Has any treatment been attempted</td>
<td>Has substance been diluted, skin been washed, eyes irrigated etc</td>
</tr>
<tr>
<td>Patient factors</td>
<td>Does the patient have any pre-existing illness, heart disease, child’s weight, BGL, etc.</td>
</tr>
<tr>
<td>Clinical course</td>
<td>What symptoms has the patient noticed since exposure to poison/medication (this can then be correlated with the agent, dose and time since ingestion to strengthen the risk assessment)</td>
</tr>
<tr>
<td>Clinical status of patient</td>
<td>ABCD</td>
</tr>
<tr>
<td></td>
<td>Blood pressure, HR, respiratory rate, temperature, O2 saturation, conscious state.</td>
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<tr>
<td></td>
<td>For other problems — especially mouth for redness or swelling</td>
</tr>
</tbody>
</table>

- Is the ingestion potentially harmful? Be aware of list of medications that can kill with ingestion of 1-2 tablets or a small sip - not an exhaustive list, but common medications:
  - Amphetamines
  - Calcium channel blockers – diltiazem, verapamil
  - Propranolol
  - Oral hypoglycaemics
  - Chloroquine, hydroxychloroquine
  - Opiates
  - Lomotil
  - Theophylline
  - Tricyclic antidepressants
  - Organophosphates
  - Paraquat
  - Camphor
  - Naphthalene
  - Eucalyptus oil
  - Kerosene

- Non-toxic exposures that are potentially harmful:
  - Antacids
  - Antibiotics
  - Bath oil
  - Candles (wax)
  - Chalk
  - Cigarette butts
  - Corticosteroids
  - Cosmetics
  - Detergents
  - Fertilisers
  - Hair products
  - Hand lotions
  - Inks
  - Laxatives
  - Matches (red phosphorus)
  - OCP
  - Paint
  - Shaving cream
  - Shoe polish
  - Soap
  - Sun tan lotions
  - Thermometer mercury
  - Vaseline (petroleum jelly)

- Beware of the possibility of mixed overdose
- If mixed or undetermined ingestion Paracetamol and glucose level should be done
- Never send a child home at night following an actual or possible ingestion
Immediate Primary Assessment and Management

In all cases of poisoning, early consultation with the poison centre is mandatory

DRABCD resuscitation / the collapsed patient

Danger and Decontamination
- Use universal precautions in all poisoning cases (gloves, plastic gown and mask).
- Removal of the poison if necessary.

Response
- Use age related techniques to obtain a response - AVPU

Airway
- Assess patency – Look-Listen-Feel
- Airway manoeuvres and adjuncts - airway at risk if AVPU score is a “P” or a “U” - consider securing an airway with an advanced airway – LMA or ETT

Breathing
- Assess the adequacy – Look-Listen-Feel
- 3 E’s
  - Effort of Breathing – Respiratory rate will increase in poisoning from amphetamines, ecstasy, salicylates, methanol and ethylene glycol (antifreeze) and decrease from opiates, ethanol, barbiturates and sedatives
  - Efficacy of Breathing
  - Effects on physiology
- Give O₂ to maintain O₂ saturation. If O₂ saturation are not maintained >95 % child, consult medical officer (MO) and consider intubation and ventilation
- If breathing, turn on to side in recovery position while obtaining more information (some poisons may cause both vomiting and sedation sufficient enough to result in aspiration)

Circulation
- Assess the adequacy – Look-Listen-Feel
- Cardiovascular status
  - Heart rate – tachycardia from amphetamines, ecstasy, β-agonists, phenothiazines, theophylline and tricyclic antidepressants (TCA’s). Bradycardia from β-blockers, digoxin and organophosphates
  - Capillary refill
  - Blood pressure – hypotension commonly seen in serious poisoning and hypertension from ecstasy, and monoamine oxidase inhibitors e.g. Selegiline
- Effects of circulatory inadequacy on other organs
  - Cool, pale and or cyanosed skin
  - Metabolic acidosis – sighing respirations – ABG’s if possible
- Gain IV/IO access
  - Take bloods – FBC, U+E’s, toxicology (drug levels), paracetamol levels (presentation with unknown drug), glucose level, blood gas (venous/arterial preferred screening test)
  - Treat shock with fluid bolus – 20mls/kg of a crystalloid
- Inotropes should only be given after discussion with a Paediatric Intensive Consultant (PIC). Inotropes should be avoided, as the combination of an inotrope with certain toxic substances may be proarrhythmogenic
- Monitor heart rhythm and rate – All potentially poisoned patients should have a 12
- Lead ECG regardless of vital signs – QRS prolongation and ventricular tachycardia is seen with tricyclic antidepressant (TCA) poisoning

Disability
- Assess neurological function
- AVPU/GCS – decreasing conscious level may indicate poisoning with opiates, sedatives, antihistamines, hypoglycaemic agents and antipsychotic agents (very commonly seen with quetiapine which is increasingly being prescribed)
- Pupils – size and reaction – pin point pupils suggests opiate or organophosphate poisoning and large pupils suggest amphetamines, atropine, cannabis, TCA
- Correct hypoglycaemia – 2.5ml/kg of 10% dextrose
- Treat convulsions - Benzodiazepines should be used for toxic seizures. Other medications should only be used after discussion with PIC

Other Considerations
- Correct hyper/hypothermia
- Specific antidotes may be available e.g. naloxone or NaHCO₃ and serum drug levels may help in treatment decisions
- All acts of deliberate self harm must be taken extremely seriously and require a 12 Lead ECG, paracetamol level⁶ and glucose level
- All intentional self poisonings in adolescents require admission after discussion with a medical officer
- If unexplained symptoms exist a urinary drug screen (UDS) may be indicated⁶
- Remember….
  - A +ve test does not mean the drug is the cause of the presentation (as can be detected for variable periods after use)
  - A –ve test does not mean a drug is NOT the cause of presentation (many newer drugs are not detected on UDS)
Activated Charcoal - Rarely indicated. Benefits must outweigh risks. Only give after a full risk assessment and discussion with PIC. Contraindications include:
- Patients with altered conscious state or deterioration expected from risk assessment.
- Does not bind to the following agents:
  - Alcohols
  - Corrosives/Acids/alkalis
  - Metals
  - Hydrocarbons
- Transfer to definitive care for further supportive care and monitoring.

All poisonings that arrest should have prolonged resuscitation.
Must be continued at least until discussion with a paediatric intensive consultant and/or toxicologist on-call.

Prevention

Some advice that should be utilised at home and our workplace....“Prevention is better than cure”
- Ensuring poisons are only accessible by people who need and know how to use them reduces their risk of harm.
- Make a survey of your home or workplace and identify all poisonous substances.
- Remove poisons or medicines that are unwanted. Dispose of chemicals safely using their accompanying directions. Pharmaceuticals can be returned to a pharmacy for safe disposal, which is safer and more environmentally friendly than disposal in domestic waste or flushing down a toilet. The Poisons Information Centre can also advise on methods of safe disposal.
- Store poisonous substances in their original containers in locked or child-resistant cupboards or containers out of reach of children. Do not store medicines in the refrigerator unless advised to do so by a pharmacist.
- Use non-poisonous alternatives to cleaning products, insecticides, etc. when possible.
- Keep the amount of poisonous substances stored in a home to a minimum.
- When possible, choose substances available in child-resistant packaging. However, do not rely on child-resistant packaging to prevent a child’s access to a poison.
- Read medicine labels and use according to the directions. Ensure the right:
  - Medication
  - Person
  - Dose
  - Route of administration
  - Time and frequency of administration
- Wear the recommended personal protective equipment when using toxic or caustic chemicals, for example spraying, painting, or cleaning.

Envenomation

Envenomation is the process by which venom is injected into a child usually by a bite, sting or spine of a venomous creature, causing local or systemic poisoning. Many venomous creatures exist in Australia, both on land and in the water and you need to be aware of the special considerations for your region.
Module 6

Effects of Venom
The effect of venom ranges from local effects such as pain, swelling and necrosis, to systemic envenomation that may include gross muscle twitching, paralysis, bleeding disorders, sudden collapse and death. Hypersensitivity, leading to anaphylaxis, to ant, bee and wasp venom is not uncommon. The severity and clinical effects of the envenomation depend upon the amount of venom injected through the bite. Note: Would still start with empiric AV dose and give more if required (only in consultation).

Recognition of suspected/definite bite or sting, and choosing the most appropriate management, may save a child’s life and in some cases will also relieve the pain. The diagnosis and identification of the creature causing the bite or sting may be obvious, especially if the offending creature was witnessed or has been brought in with the child, but most often identification is not clear. Occasionally, envenomation is part of the differential diagnosis of symptoms experienced by a child who with was not aware of the sting/bite or is too young to provide an appropriate history. Diagnosis may be made by the development of specific symptoms or by the use of diagnostic kits that identify the presence of specific venoms. Unfortunately, diagnostic systems are not generally available in many areas where stings and bites are common.

Principles of management of bites and stings causing potential life-threatening envenomation are:
- Always DRABCD – resuscitation as necessary
- Recognition of suspected / definite venomous bite or sting
- First aid management and prevention of absorption and systemic spread of venom
- Clinical and laboratory assessment
- Provision of supportive care – including pain management and treatment of site of local injury
- Administration of antivenom if indicated and available
- Tetanus prophylaxis as indicated by immunisation status

All envenomations that arrest should have prolonged resuscitation. Must be continued at least until discussion with a paediatric intensive consultant and/or toxicologist on-call

Snake Bite
Effects of Snake Venom
The outcome of the bite depends on the species of snake, area bitten, number of times bitten, amount of venom injected. Snake venom contains many toxic substances which cause a range of life threatening effects. An early life threatening effect of Australian snake venom is consumptive coagulopathy. Snake venom may have a number of effects:
- Local effects – depend on the snake type, and range from painless bites to immediate, significant pain, swelling and scratches
- Neurotoxicity – venom causes paralysis, which may result in respiratory failure - ABCD. Presynaptic neurotoxins cause inhibition of acetylcholine release, resulting in progressive paralysis. Postsynaptic neurotoxins result in inhibition of neuromuscular activation, also resulting in paralysis. The first signs are usually evident in smaller ocular muscles causing ptosis (drooping upper eyelids) and diplopia (double vision) and bulbar palsy (affecting chewing, swallowing and talking) with onset between 1 to 10 hours following envenomation. Symptoms can later progress to dysarthria and more generalised weakness.
Coagulopathy – the majority of Australian snakes cause bleeding due to coagulation failure. Venom may be either a procoagulant or an anticoagulant, but both produce similar, rapid, coagulation disorders. Signs of overt bleeding should be sought following snakebite. Low-grade bleeding from gums and epistaxis are common

Myotoxicity (muscle destruction) – venom causes breakdown of muscle cells, muscle pain and necrosis. The presence of muscle pain, weakness, and dark urine suggests that massive rhabdomyolysis has occurred. Urine dipstick tests for the presence of blood detect both myoglobin and haemoglobin and positive results are suggestive of significant rhabdomyolysis that may lead to renal failure

Life threatening effects may not be seen for hours. However when massive envenomation occurs, especially in children, symptoms and signs may appear within minutes. Non-specific signs and symptoms: Nausea and vomiting, abdominal pain, dizziness, headache. Easily confused with anxiety caused by contact with creature

Diagnosis
In the majority of cases there is a history of suspected or definite snakebite. Ongoing assessment and management is focused on whether the patient is envenomed or not. Rarely is the snake identified (even if it is brought with the patient, unless professional herpetologist available). Need to know what snakes are in your area and which snakes cause which constellations of symptoms. Do NOT ask the patient/family to bring the snake in with them!

Signs and symptom\textsuperscript{5,8,10}
Depending on the type of snake the following may present
- Fang marks - may be atypical, invisible or look like scratches rather than puncture wounds. (bite site may be painful, but usually is not). Most bites occur on limbs
- Early, common and non-specific systemic features are: Headache / nausea / vomiting / abdominal pain
- Tender lymphadenopathy (sometimes)
- Muscle paralysis (ptosis, blurred vision, facial / bulbar weakness, generalised weakness, respiratory paralysis)
- Coagulopathy - may only show on laboratory testing or may cause overt bleeding i.e. oozing from cannula/venepuncture sites, old wounds, gums etc…
- Hypotension
- Rhabdomyolysis / renal failure
- Circulatory failure, collapse and unconsciousness

Management\textsuperscript{5,8,10}
The principles of management of snakebite are:
Always ABCD and..
1. Prevent absorption of venom
2. Identifying the type of snake
3. Detect envenomation
4. Antivenom (AV)

All potential bites need to be transferred to a health facility, where there is a doctor, antivenom and laboratory. They should not be managed in remote communities without access to all 3
Prevent Absorption Of Venom

The most effective first aid measure to prevent the absorption of snake venom is the Pressure Immobilisation Bandage (PIB). Apply a PIB to the bitten limb. If the bite is on the trunk, apply firm pressure to the bite site. The aim of the PIB is to retard the absorption and transport of venom via the lymphatic system, from the periphery to the circulation. Research has shown that very little venom reaches the bloodstream via the lymphatic system if pressure is applied over the bitten area and the limb is bandaged and immobilised. This is achieved firstly by compressing the lymphatic vessels at the bite site by bandaging. Secondly proximal movement of the lymph vessels is slowed or stopped by splinting the limb, stopping muscle movement. It has also been shown that there may be inactivation of certain venoms and venom components when the injected venom remains trapped in the tissues by pressure bandage.8

Process

- Locate bite site
- Immediately apply firm pressure over the bite site and apply PIB
- Do not remove bandages or splint until definitive treatment is available

Pressure Immobilisation Bandage2,3,5,8,10

- Use this method for a bite on a limb. If bitten on the head or torso, just bandage the bite site
- Keep monitoring ABCD
- Keep the patient calm and reassured and lying or sitting still (at rest)
- DO NOT wash, cut or drain the wound, or apply suction
- Work quickly; do not bother to remove clothing. Bandage over the top
- After bandaging don't forget to mark where the bite site is
- Seek urgent medical assistance now that first aid has been applied.

What you need

- 3 or more tension/elastic compression bandages
- Something to use as a splint
- Tape
- Texta/pen (for marking bite site)

What you do

Put on the bandage:

- Wrap the bandage over the bite site and then from the fingers or toes
Module 6

- Upward as far up the limb as possible, to compress lymphatic vessels, and tape in place

- Fingers/toes should be included in the bandaging, to prevent them moving and creating muscle movement
- Leave the tips of the fingers or toes visible so you can check circulation
- Bandage firmly (as for a sprain) but not so tight as to cut circulation — firm enough to make it difficult to insert fingers under the bandage
- Draw a cross with texta/pen etc on the bandage to mark the site of the bite – as above

For bites to the foot or leg:
- Use the third bandage to bind the splint to the limb
  - Wrap the bandage firmly to as much of the limb as possible to prevent muscle, limb and joint movement. This will help stop the venom moving through the body

- If a splint is not handy, then tie the legs together
Module 6

For bites to the arm or hand:
- Bandage as far up the arm as possible, with the elbow in a bent position and leaving the finger tips visible
- Use the second bandage to bind the splint to the limb along the forearm
- Put in sling to stop movement

Identifying the Type of Snake\(^{2,3,5,8,10}\)
- Use Snake Detection Kit if available - Identifies which is the appropriate AV to use. Does NOT identify the snake. And does NOT imply envenomation. Takes 20 – 30 minutes
- The VDK is capable of detecting venom from the bite site, blood and urine, and helps to select the type of snake antivenom to be used. A swab from the bite site will generally provide the best result, followed by urine and then blood
- Follow the instructions in the kit carefully

Detect Envenomation\(^{8,10}\)
Evidence of envenomation may include:
- A story that confirms snakebite
- Bite marks, or punctures/scratches on the skin, but these may easily be missed
- Nonspecific symptoms such as nausea, vomiting, abdominal pain, and headache. These are often the first clinical indications of systemic envenomation
- Neurotoxic symptoms (as above)
- Coagulopathy (as above) - iStat INR’s are not reliable in detecting coagulopathy from snake envenomation, hence should NOT be used in this setting. Where available, coagulation parameters such as INR, aPTT, fibrinogen and fibrin degradation products (FDP’s) should be taken early as a baseline. If not available, a whole blood clotting time can be used at the bedside. Need a glass tube for sample.
- Hypotension and shock – the mechanisms for these findings include: vasodilation, a direct action of venom on the myocardium, and/or hypovolaemia due to bleeding. Important to assessment fluid status clinically
- Rhabdomyolysis (as above)
Antivenom

- Only give antivenom to patients with significant systemic features of envenomation or coagulopathy\textsuperscript{10,11}
- Don’t give antivenom to patients who only have lymphadenopathy, minor headache / nausea / vomiting / abdominal pain, or minor disturbance of coagulation (discuss with paediatric intensive consult and toxicologist on call)\textsuperscript{10}
- Once VDK result available - Use AV that corresponds with well that comes up +ve on VDK.\textsuperscript{11}

<table>
<thead>
<tr>
<th>Antivenom type\textsuperscript{11}</th>
<th>Initial Dose</th>
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</thead>
<tbody>
<tr>
<td>Brown Snake</td>
<td>IV - dilute up to 1 in 10, with an isotonic crystalloid solution (e.g. saline, Hartmans or dextrose), each vial/dose should be run over 15-30 minutes.</td>
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<tr>
<td>Tiger Snake</td>
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<tr>
<td>Black Snake</td>
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<tr>
<td>Death Adder Snake</td>
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<tr>
<td>Taipan Snake</td>
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<tr>
<td>Polyvalent Snake</td>
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</table>

- Doses should be repeated if patient remains symptomatic, or if coagulopathy persists, 30 minutes after dose (multiple doses may be needed with medical consultation)
- Risk of anaphylaxis with Australian AV is approximately 5%. Need to be prepared to treat this if it occurs, so should have adrenaline drawn up at the bedside (0.01ml/kg 1:1000 SC) as well as resuscitation equipment including O\textsubscript{2} therapy.
- Premedication is not routinely indicated.
- No need to give steroids at this stage, can be given once situation is more stable and after discussion. Sometimes used to decrease the risk of serum sickness which can occur at 5-10days following AV use.

Other supportive treatment\textsuperscript{2,8,10}

- As indicated – e.g. ventilation, circulatory support, renal support
- FFP and platelets may be needed for coagulopathy but will not help unless sufficient antivenom is also given

Points to remember

- Consider all snake bites as potentially venomous
- Apply PIB to all suspected snakebites regardless of clinical condition
- Never rely on witness's or your identification of the snake - use the VDK
- Repeated doses of antivenom may be needed after discussion
Envenomation Bites Flowchart

On arrival – check primary survey DRSABCD
Insert IVC; take bloods for FBC, INR, aPTT, fibrinogen and FDP’s
All potential snakebite victims need to be treated in a facility with a doctor, laboratory and antivenom

Possible bite
Patient asymptomatic with normal coagulation studies

Remove PIB
Repeat bloods and exam -1hr & 6hrs
Observation for up to 12 hours - return if any symptoms develop
Never discharge at night

Definite bite
Patient asymptomatic with normal coagulation studies

Admit/Transfer
Repeat bloods and exam -1hr & 6hrs
Observation for up to 12 hours - return if any symptoms develop
Never discharge at night

Definite bite, stable
Patient mildly symptomatic or abnormal coagulation studies

Admit/transfer
Swab bite site (cut window)
Use Venom Detection Kit
Give antivenom** if significant systematic symptoms or coagulopathy. Discussion with Paediatric intensive Consult/Toxicologist regarding further management

Patient unstable
Hypotension
Bleeding
Paralysis

Admit/transfer
DRSABCD - Resuscitation
Leave PIB and if not one insitu apply
Use Venom Detection Kit
Give antivenom**
Discussion with Paediatric intensive Consult/Toxicologist regarding further management

**Empiric use of AV should be based on snakes present in the local region. Monovalent AV preferable, but polyvalent AV where multiple possibilities exist
Spider Bites
Although spider bites are common, most cause minor effects and usually do not require treatment. More significant effects result from Redback and, less commonly, from Funnel-web spider bites.
There is NO evidence that the white-tail spider, or any other Australian spider, causes skin breakdown or ulceration (necrotic arachnidism). Other causes for lesions should always be sought. For more information about notable spiders please review the following website http://www.toxinology.com/generic_static_files/cslavh_spiders_other.html#badumna

Redback Spider
Female Redback spiders are most dangerous and found all over Australia. A Redback spider bite is poisonous and potentially fatal for children.8

Signs and Symptoms3,5,8,10
Local
- Pain (often becomes intense) - Radiating pain from bite site to close limb, trunk, local lymph nodes
- Erythema
- Oedema
- Usually sweating around bite site — or may be strange patterns of regional sweating, e.g. sweating below both knees

General (gradual onset over hours or days)
- Feeling unwell
- Irritability and agitation
- Headache
- Nausea/Vomiting
- Abdominal pain
- Tachycardia / hypertension
- Muscle aches/weakness
- Sore Joints

Management3,5,8,10
- Always DRABCD
- Identify bite site and apply cold pack to lessen pain
- Opioid analgesics generally only make the patient drowsy without alleviating the pain
- If indicated, Redback Antivenom is available
- Consider tetanus prophylaxis
- Pressure immobilisation is not recommended due to the slow progression of symptoms and the fact that they are generally not life threatening. Furthermore, reducing the movement of venom away from the site might increase the intensity or duration of the local pain

Antivenom10,12
- Significant envenomation requiring antivenom treatment is usually indicated by marked local pain and the onset of more generalised features within 2 to 4 hours
- The antivenom consists of a small volume (~ 0.5ml) of equine antibody, and is usually given by intramuscular injection
- The dose should not be reduced for children, whose lower body weight may make them more susceptible to severe envenomation.
The rate of reaction to the antivenom is low (approximately 0.5% in one series). But must be prepared to treat anaphylaxis and have adrenaline drawn up at bedside in appropriate dose.

Antivenom should only be given after discussion with PIC. One ampoule of red back spider antivenom is usually given intramuscularly. The dose is repeated after 2 hours if generalised signs of envenomation remain.

The antivenom may be administered intravenously after 1:10 dilution for severe muscle weakness or if there is no response to 1-2 intramuscular doses of red back spider antivenom.

After administration of antivenom - patients should be observed for at least one hour for symptom recurrence.

Funnel Web Spider
Funnel web spiders are Australia’s most venomous spider, mostly found on the east coast. The male is more dangerous than the female and they are capable of causing death in as little as 15 minutes. Funnel web spider venom contains potent neurotoxins, causing an acute massive release of neurotransmitters at autonomic and neuromuscular junctions with associated hyperactivity and muscle twitching. Antivenom was introduced in 1980 and since that time no definite deaths have been recorded, and time spent by bite victims in hospital has been greatly reduced.\(^8\)

**Signs and symptoms\(^3,5,8,10\)**
- Usually very painful
- Fang marks often visible, most common on limbs
- Tingling of lips
- Twitching tongue
- Profuse sweating, salivation, lacrimation
- Piloerection
- Tachycardia, progressive hypertension
- Oral paraesthesia,
- Muscle fasciculation and muscle spasms

**Management\(^3,5,8,10\)**
- Always DRABCD
- Reassure patient and keep calm
- Locate bite site and immediately apply PIB to the affected limb
- Administer analgesia if indicated
- Funnel Web Antivenom is available
- Medical evacuation if significant ongoing symptoms, ideally to a centre where antivenom, resuscitation equipment and monitoring are available

**Marine Envenomation**
Injuries and life threatening marine envenomation are divided into:
- Jellyfish stings following contact with tentacles;
- Penetrating injury from spiny stinging fish; stingray barbs; and bites from blue ringed octopus.\(^8\)
Jellyfish Stings
Many varieties of jellyfish are found in Australian waters. All have tentacles with millions of nematocysts, or specialised stinging cells located on the surface. Nematocysts contain coiled threads filled with venom which act like harpoons when the tentacle comes in contact with the skin and deliver venom into the victim. Jellyfish stings that may require resuscitation are most likely to be in tropical locations in Northern Queensland, Northern Territory or tropical Western Australian coastlines during the summer months.8

Jellyfish sting and treatment summary3

<table>
<thead>
<tr>
<th>Box jellyfish (Chironex fleckeri)</th>
<th>Irukandji (Carukia barnesi)</th>
<th>Bluebottle (Physalia)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sting</strong> Whip-like sting marks with characteristic frosted ladder pattern</td>
<td><strong>Sting</strong> Minimal skin markings with possible red rash</td>
<td><strong>Sting</strong> Linear erythematous eruption with discrete oval wheals</td>
</tr>
<tr>
<td><strong>Treatment</strong> Douse with vinegar for at least 30 seconds, to inactivate all undischarged sting cells. Provide analgesia If life threatening sting, give box jellyfish antivenom</td>
<td><strong>Treatment</strong> Douse with vinegar to wash off adherent tentacles Provide analgesia</td>
<td><strong>Treatment</strong> Immersion in water as hot as person can tolerate for 20 minutes. Avoid burning the patient Provide analgesia</td>
</tr>
</tbody>
</table>

Box Jellyfish
The extent of envenoming is dependent on the area of discharged tentacle contact with skin. Contact with a large amount of tentacle over a >10% of skin area is potentially lethal, especially in children. Systemic envenomation can occur within minutes of the sting, with cardiac dysfunction and possible cardiac arrest within 5 minutes.8

Signs and symptoms3,5,8,10

- Immediate excruciating burning pain at every point of skin contact
- Red linear welts on skin, the affected areas may develop blistering and necrosis
- Tentacles may remain adherent to skin unless physically removed
- Irrational behaviour due to pain or other effects of venom
- In severe envenomation – collapse, unconsciousness, cardiac and respiratory arrest

Management3,5,8,10

- Always DRABCD
- Reassure child and parents
- Restrain the child from rubbing sting area or attempting to remove tentacles, this may worsen the risk of envenomation by causing the discharge of nematocysts. PIB is contraindicated
- Topical household vinegar – to inactivate all undischarged stinging cells. Pour large amounts (at least 1-2litres) of vinegar over the affected skin area and adhering tentacles
Module 6

- Remove tentacles only after all tentacles have been doused with vinegar and inactivated. Use forceps, scalpel blade or credit card to remove adherent tentacles.
- Vinegar **does not** reverse the effects of the venom already injected and **does not** reduce pain.
- Administer analgesia; cold packs may reduce skin pain in conscious patients.
- Provide supportive care - Life threatening effects occur early. If a patient is haemodynamically stable with no systemic signs, and is complaining of pain only, their ongoing risk of life threatening effects in negligible. Pain management acutely and ongoing wound management is still required.
- Consider evacuation.
- Administer box jellyfish antivenom if:
  - Evidence of systemic envenomation and cardiac instability
  - Severe pain which cannot be controlled with pain relieving medicines
  - Extensive skin lesions - Not in isolation (i.e. not in a stable patient)
  - Difficulty breathing, cardiac arrhythmias and cardiac failure/arrest

**Note:** AV use is controversial and should only be given after discuss with PIC. It is not indicated for skin lesions alone.

- All patients need to be followed closely on discharge due to high risk of skin breakdown at sites of tentacle contact. Manage, as with burns, some may need skin grafting.

**Antivenom**

- 1 ampoule IV/IO — mixed with 10ml/kg of normal saline. Give slowly over 30 minutes recommended. Consider giving in an undiluted push only if in cardiac arrest.
- If no immediate response — give more ampoules.
- If doesn’t get better OR breathing or circulation get worse
  - Continue assessment of ABCD.
  - Medical consult straight away — may suggest
  - More box jellyfish anti-venom (up to 6 ampoules)
  - Consider Adrenaline.
  - These must be tried before stopping CPR.

**Irukandji**
The Irukandji jellyfish sting may cause symptoms known as the Irukandji syndrome.

**Signs and symptoms**

- Sting usually minimally painful.
- Minimal or absent welts.
- Systemic effects usually develop 15 – 40 minutes following initially bite and includes:
  - Agitation, restlessness
  - Feeling unwell
  - Vomiting
  - Profuse sweating
  - Severe pain typically in low back but may be localised or generalised. Often not distributed in the area of the initial sting
  - Severe Hypertension
  - Tachycardia
  - Severe envenoming may result in cardiomyopathy, cardiogenic shock, pulmonary oedema or infarction.
Module 6

Management 2,3,5,8,10

- Always DRABCD
- Topical vinegar
- Analgesia
- Supportive care and management of symptoms 3,13
  - Administer IV fentanyl (0.5–1.0 microgram/kg/dose) repeated every 10 minutes until appropriate analgesia is achieved. Large doses may be required (e.g. 200–300 microgram). Note: If fentanyl is not available, give morphine 0.1 mg/kg IV in titrated doses
  - Treat nausea with IV promethazine (25 mg; 0.5 mg/kg in children)
  - Control hypertension refractory to opioid analgesia with an intravenous infusion of glycercyl trinitrate (50 mg in 100 mL starting at 6 mL/minute; 1–4 microgram/kg/minute in children) titrated to achieve a systolic blood pressure <160 mmHg
  - IV MgSO₄ infusion may help with pain control. Effect varies between individuals and seemingly between different geographical regions. Initial bolus 0.15mmols/kg over 15mins then 0.1-0.15mmols/kg/hr
  - All patients need a 12 lead ECG and if systemically unwell FBC/EUC/troponin.
  - Will need evacuation if systemically unwell or pain management issues.
- No Antivenom available

Bluebottle Jellyfish
Severity of sting usually depends on the amount of contact the skin has had with the tentacle.

**Signs and symptoms** 3,8

- Immediate, moderate to severe pain, usually decreases after 1 to 2 hours
- Red swollen, itchy lines where tentacle has touched skin

**Management** 3,8

- Always DRABCD
- Reassure child and parents
- Remove tentacles by washing area with sea water and carefully pick off tentacles, preferably with forceps
- Immers the sting area in hot water or direct hot shower (no hotter than the rescuer can tolerate). Immersion of the sting in hot water is thought to inactivate the venom and therefore relieve the pain 14
- Vinegar is not recommended
- Analgesia
Blue Ringed Octopus
Bites are rare and usually only occur when children carry and handle these small shy creatures. At rest they are plain coloured without visible pattern. The venom is very potent and is injected via a beak, not tentacles. The venom contains Tetrodotoxin, which causes motor paralysis.  

Signs and symptoms
- Often a painless bite
- Tingling sensation around the mouth
- Local symptoms are minimal or absent
- Collapse on or near the beach shortly after a minor bite
- Early signs of systemic envenomation:
  - Ptosis
  - Blurred vision
  - Double vision
  - Difficulty swallowing
- Flaccid paralysis - occurs within minutes of bite
- Respiratory / cardiac arrest - can occur within minutes

Management
- Always DRABCD
- The pressure-immobilisation technique may slow spread of the venom and should be applied.
- Supportive care including ventilatory support
- There is no antivenom available

Cone Snail
Cone snail venom is injected into the victim via a muscular venom bulb, shaped like a harpoon. The venom contains neurotoxins. 

Signs and symptoms
- Local pain, swelling and numbness
- Can progress to muscle uncoordination and weakness, disturbance of speech, vision and even hearing
- Swallowing / breathing difficulties and respiratory paralysis if severe envenomation

Management
- Always DRABCD
- Apply PIB – must be left in place until resuscitation facilities are available
- Support ventilation
- Wound care – always consider risk of infection and foreign body in wound site
- No antivenom is available
Stinging Fish
A variety of stinging fish cause local painful reactions. Bullrouts and Stonefish have dorsal spines that contain venom which is injected into the victim when the spine is pressed, e.g. stood on.

Signs and symptoms
- Immediate severe pain
- Localised swelling, sometimes bluish discolouration
- Open wound

Management
- Always DRABCD
- Immerse the stung area in HOT WATER – may be effective pain relief. Ensure first that it is not so hot that skin damage may occur.
- May require intravenous opioid analgesia or local anaesthetic injected into the wound – 1–2% lignocaine
- Wound care at sting site – removal of residual spine(s) and consideration of prophylactic antibiotics
- Administer stonefish antivenom if indicated, i.e. intense pain, paralysis, weakness and multiple puncture sites
  - AV should be given only IM, not IV. Prior to commencing antivenom therapy, make sure everything by the bedside to treat anaphylaxis, should this occur. Specifically, have adrenaline ready to give. For 1 to 2 spine puncture wounds, give 1 vial of AV IM. For 3 to 4 spine puncture wounds give 2 vials of AV IM

Stingray injuries
Stingrays have venom in their tails (barbs) but trauma of penetrating injury is usually more significant than envenomation. The stingray whips its poison barbed tail around, lacerating the foot or lower leg, sometimes leaving a portion of the barb behind. The mechanical injury can be severe, with fatal cases due to direct heart or bowel puncture or transection of major limb vessels. Nerve or tendon damage can occur.

Management
- Always DRABCD - Stop any profuse bleeding with application of local pressure bandage
- Wound management - Always check the wound for foreign bodies, allow closing by secondary intention and considering prophylactic antibiotics. The severe local pain may require major analgesia or regional nerve block. There is no antivenom.
Summary
- Always DRABCD – resuscitation as necessary
- Recognition of suspected / definite venomous bite or sting
- First aid management and prevention of absorption and systemic spread of venom
- Clinical and laboratory assessment
- Provision of supportive care – including pain management and treatment of site of local injury
- Administration of antivenom if indicated and available
- Tetanus prophylaxis as indicated by immunisation status

Emergency numbers for bites and stings

National Poisons Information Centre: 131 126
Commonwealth Serum Laboratories: (03) 9389 1911
Australian Venom Research Unit: (03) 9483 8204
Module 6

References


3. The State of Queensland (Queensland Health) and the Royal Flying Doctor Service (Queensland Section), (2011) Primary Clinical Care Manual. 7th edition. Cairns


