



## PAEDIATRIC ACUTE CARE GUIDELINE

### Snake Bite

<b>Scope (Staff):</b>	All Emergency Department Clinicians
<b>Scope (Area):</b>	Emergency Department

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<http://kidshealthwa.com/about/disclaimer/>

## Snake Bite

This is a general approach to snake bite – for specific management details, please contact **Poisons Information: 131126** or refer to the [Toxicology Handbook](#)

### Quick Reference Guide



## Background

- Definitive severe envenomation is rare but can be lethal
- The workup for suspected snake bite is time critical
- Apply pressure immobilisation bandage for suspected snake bites that present to Emergency if one is not already insitu

### General

- Snakes that can be found in Western Australia include: black snakes (Mulga or King Brown), brown snakes (Dugite, Western Brown), Death Adders, Tiger Snakes, Taipans and sea snakes
- Around Perth, brown snakes are found everywhere, Death Adders in the hills, brown snakes in sand and Tiger Snakes in waterways

## Assessment

- Snake bites are time critical presentation
- Rapidly complete initial physical examination and laboratory tests

## History

- Geographical area where the patient was bitten may aid in determining the type of snake
- Appearance of snake (note: this is often unreliable)
- Time of snake bite, site of bite, number of bites
- Use of pressure immobilisation bandage and other first aid treatment prior to hospital arrival

## Examination

### General Examination:

- Observations (vital signs, neurological observations and neurovascular observations of the bandaged limb)
- Mental status
- Bite site – anatomical location, appearance
- Lymphadenopathy
- Evidence of bleeding
- Cardiovascular, respiratory and neurological examinations

### Signs of Envenomation:

#### Systemic Signs:

- Neurological: headache, photophobia, irritability, confusion, seizures
- Cardiovascular: hypotension, collapse
- Respiratory: respiratory failure (due to muscle paralysis)
- Gastrointestinal tract: nausea, vomiting, abdominal pain
- Other: mild fever

#### Tissue Specific Signs:

		Clinical Signs	Laboratory Tests
Neurotoxic	<ul style="list-style-type: none"> <li>• Act on the neuromuscular junction of the skeletal muscle, causing progressive paralysis</li> <li>• Can be pre-motile or post-motile</li> <li>• Order of progression tends to be cranial nerve palsies → distal muscles → respiratory muscles</li> </ul>	<ul style="list-style-type: none"> <li>• Drooping, partial ophthalmoplegia with diplopia</li> <li>• Dysarthria, difficulty swallowing, choking</li> <li>• Loss of facial expression</li> <li>• Loss of reflexes</li> </ul>	
Myotoxic	<ul style="list-style-type: none"> <li>• Direct muscle fibres causing destruction of muscle cells with release of myoglobin</li> <li>• Causes muscle weakness, pain or necrosis</li> <li>• Leads to secondary acute tubular necrosis and renal failure</li> </ul>	<ul style="list-style-type: none"> <li>• Pain on contracting muscles against resistance</li> <li>• Muscle tenderness</li> </ul>	<ul style="list-style-type: none"> <li>• CK</li> <li>• Urea</li> <li>• Other markers for blood myoglobin</li> </ul>
Hemorrhagic	<ul style="list-style-type: none"> <li>• Phospholipase – causes a widespread rapidity destruction of fibrinogen, and increased fibrin degradation products (FDP), disseminated intravascular coagulation, bleeding tendency</li> <li>• Antithrombin – causes an anticoagulant effect without generation of FDP</li> </ul>	<ul style="list-style-type: none"> <li>• Swelling close from the bite site or contusions after intramuscular injection, bleeding tendency</li> <li>• Signs of cerebral irritation (prolonged haemorrhage)</li> </ul>	<ul style="list-style-type: none"> <li>• Coagulation profile</li> <li>• Fibrinogen</li> <li>• FDP – degradation products</li> <li>• Haptoglobin</li> </ul>

## Clinical and Laboratory Features of Snake Bites:

	Coagulopathy	Neurological - Paralysis	Rhabdomyolysis	Other
<b>Brown Snakes:</b> Western Brown Snake (Gwarder) Dugite	Always present	Rare	No	<ul style="list-style-type: none"> <li>Renal failure uncommon</li> <li>Microangiopathic haemolytic anaemia</li> <li>Thrombocytopenia</li> </ul>
<b>Black Snakes:</b> King Brown (Mulga)	Mild (raised APTT but normal fibrinogen)	No	Develops over hours to days	<ul style="list-style-type: none"> <li>Renal failure can occur</li> <li>Significant local bite site pain</li> </ul>
Tiger Snake	Always present	Slow onset over hours (pre-synaptic)	Slow onset over hours	<ul style="list-style-type: none"> <li>Renal failure can occur</li> <li>Microangiopathic haemolytic anaemia</li> <li>Thrombocytopenia</li> </ul>
Death Adder	No	Slow onset over hours (post-synaptic)	No	<ul style="list-style-type: none"> <li>Local bite site pain is common</li> </ul>
Sea Snakes	No	Rapid onset (pre-synaptic)	Develops over minutes to hours	<ul style="list-style-type: none"> <li>Renal failure can occur</li> </ul>

## Investigations

### Blood Tests:

- Coagulation profile - INR, APTT
- Fibrinogen
- D-dimer, fibrin degradation products
- FBC
- Creatinine kinase (CK)
- Urea, electrolytes, creatinine (U&E)

### Other Tests:

- Snake venom detection kit. See ED guideline [Venom Detection](#)
- Urine microscopy - red blood cells, myoglobin

## Resuscitation

First Aid
<b>DO</b> Reassure the patient Keep the patient still (bring transport to them) Immediately apply a pressure immobilisation (compression) bandage, then splint the limb Seek medical attention urgently
<b>DON'T</b> Wash the wound Incise the wound Suck the wound Use the tourniquet

**Pressure Immobilisation Bandage:**

- To delay the lymphatic spread of toxin from the bite site by compressing the lymphatic vessels at, and proximal to the bite site
- Immobilise the limb to prevent “muscle pump” effect
- Animal studies show little movement of venom centrally if the limb is still
- Avoid further activity – keep the patient still

**Technique:**

- Apply a broad crepe bandage over the bite, and extend it (or a 2nd bandage) as proximal as possible
- Apply the same amount of pressure as one would for a sprained ankle
- Do not occlude the circulation
- Splint the limb once pressure bandage applied

**The pressure immobilisation bandage should not be removed until:**

- The patient has been fully assessed in hospital and there is no evidence (clinical or initial laboratory tests) of envenomation or if envenomed – antivenom has been administered
- A small window (to inspect the bite site and obtain a swab) may be created by slightly separating the crepe bandage

## Initial management

- The patient must be transferred to a hospital that has doctors able to manage a snake bite, a 24 hour laboratory and adequate antivenom stocks for further management
- The patient must be monitored in hospital and serial laboratory tests performed according to the history and clinical examination
- After initial resuscitation, it must be determined if the patient is envenomed
- Appropriate antivenom should be chosen – according to geographical area (likely snake species), the clinical features, the investigation results and the snake venom detection kit results
- Consider the need for analgesia
- Further information can be obtained from **Poisons Information: 131126** or refer to the [Toxicology Handbook](#)

## Further management

### Side Effects of Antivenom:

- Anaphylaxis (1% for monovalent, 5% for polyvalent)

### Management of Antivenom Reactions:

- Stop the antivenom infusion temporarily
- High flow oxygen
- IV Hydrocortisone 4mg/kg
- IV Promethazine 0.25mg/kg (be aware of its sedating and hypotensive effect)
- Recommence antivenom infusion as soon as clinically possible at a slower rate

If true anaphylaxis has occurred:

- Refer to ED guideline: [Anaphylaxis](#)

## Adjuvant Therapy:

### Blood Products:

- Use of blood products is controversial – they should be reserved for life threatening haemorrhage
- Never administer fresh whole blood to correct coagulopathy unless procoagulants in the venom have first been neutralised by antivenom
- If whole blood is given too soon the active procoagulants will react with the fresh blood and worsen coagulation, risking organs and limbs. Fresh frozen plasma is the product of choice to correct coagulopathy.

## Complications:

### Serum sickness:

- Warn all patients who have received antivenom about the possibility of delayed serum sickness
- May occur up to 21 days after antivenom administration, and is characterised by fever, rash, generalised lymphadenopathy, aching joints and sometimes renal impairment
- Prevention: oral steroids (Prednisolone) 1mg/kg/day for 5 days is recommended for patients who received high doses of antivenom, either as a single dose of polyvalent antivenom or multiple doses of monovalent antivenom
- Treatment: Prednisolone 1mg/kg for a week is usually all that is needed if serum sickness occurs

## Medications

### Administration of Antivenom:

- Refer to [Toxicology Handbook](#) for dosage
- Type of antivenom used depends on the geographical site, clinical features and laboratory tests
- Monovalent is always preferred to polyvalent as it is safer (less side effects), cheaper and specific
- Intravenous administration
- Dilute antivenom 1 ampoule in 0.9% saline 10ml/kg
- Administer infusion over 30 minutes
- Repeat bloods 30 minutes post administration of anti venom to check response
- Titrate the antivenom against clinical and coagulation status

**Note:** Unlike most medication doses in children, the amount of antivenom required is not related to the child's weight, but is determined by the degree of envenomation sustained. The amount of antivenom required is a neutralising dose for amount of venom injected, which is not related to the size of the child and may at times result in large doses.

## Admission criteria

- Patients are monitored in hospital with serial clinical examination and laboratory tests at 1, 6 and 12 hours (or until evidence of envenomation occurs)
- If evidence of envenomation occurs at any time, administer the appropriate antivenom

## Discharge criteria

- Patients can be discharged at 12 hours after the removal of the pressure immobilisation bandage if there has been no evidence of envenomation
- Do not discharge at night

## Nursing

- If any systemic and/or tissue specific signs of envenomation become evident, document and report immediately to the medical team

## Observations

- Baseline observations include heart rate, respiratory rate, oxygen saturation, temperature, blood pressure, pain score, neurological observations and neurovascular observations (of the bandaged limb)
- Minimum of hourly observations should be recorded whilst in the emergency department
- Any significant changes should be reported immediately to the medical team
- A baseline ECG should be performed on arrival

## Internal hospital links

[Toxicology Handbook](#)


## Tags

adrenaline, anaphylaxis, antivenom, bite, black, bleeding, brown, coagulation, collapse, confusion, convulsion, detection, dic, dugite, dysarthria, envenomation, fit, headache, hydrocortisone, irritability, king brown, mulga, muscle weakness, nausea, pain, paralysis, photophobia, polyvalent, promethazine, ptosis, sea, seizure, serum sickness, snake, snake bite, snakebite, steroids, taipan, tiger, urine, venom, venomous, western brown

## References

- Murray L, Daly F, Little M, Cadogan M (2011) Toxicology Handbook, 2nd Edition, Elsevier Australia.

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