



Snakebite Management Guideline

1. Guiding Principles

This guideline provides direction to WA Country Health Service (WACHS) staff regarding best practice management of all snakebite cases.

This document provides a general approach to snakebite management. Snakebite management with signs of envenomation should occur in conjunction with advice from Clinical Toxicologists via the Poisons Information Centre. The nation-wide number is 131126.

2. Important Information

2.1 Introductory remarks

This guideline and its supporting procedure seek to ensure that snakebite management is conducted systematically in rural practice at all sites.

Australia has a range of snake fauna, which includes snakes that are highly venomous. The six major categories of Australian snakes are the brown snakes, black snakes, death adder, tiger snakes, sea snakes and the taipans (1). Monovalent antivenoms are available for each genus of venomous Australian snakes. It is estimated that there are between 500 to 3000 snakebites annually, out of which 200-500 cases require antivenom. Snakebites are potentially lethal, but deaths are rare and are minimized with timely first aid, supportive care and antivenom in selected cases. Snakebites occur commonly during the summer months. (2)

2.2 Snake Identification

Identification of snake genus on the basis of physical characteristics is unreliable even when performed by an expert herpetologist. As a result, all snakebites are assumed to be potentially lethal and require hospital admission for evaluation.

In the setting of confirmed systemic envenoming, selection of appropriate antivenom is achieved with the use of:

- i. geographical area
- ii. clinical and laboratory features of the envenoming

2.3 Transportation to an appropriate medical facility

Patients who have clinical features of envenomation may receive treatment with antivenom as part of their initial stabilisation on the advice of a clinical toxicologist or emergency telehealth service (ETS) prior to transfer to a facility with laboratory capability.

Following administration of first aid (Pressure Bandage Immobilisation), the patient should be stabilised then transported as soon as possible to a hospital that meets the following criteria:

- i. doctor that is willing and able (with support) to manage snakebite
- ii. laboratory facilities able to be activated at all hours
- iii. adequate antivenom stocks.

2.4 Expert assistance with snakebite management

All cases of suspected snakebite should be discussed with a FACEM or ETS doctor. Where there are any signs of potential envenomation consultation with the toxicologist can provide advice on management, logistics, transfer, and also facilitate tertiary hospital care when appropriate. Advice can be obtained 24 hours a day by calling the Poisons Information Centre (PIC) on 131126, or by calling the Perth adult tertiary hospitals with toxicology services (Royal Perth, Sir Charles Gairdner,) and asking to speak to the Clinical Toxicologist on call.

RFDS clinical coordinator (1800 625 800 or 94176364) is a valuable resource when considering transport logistics. The ETS must be contacted by hospitals with intermittent or no on-site medical cover.

2.5 Snake Venom Effects

Snake Venom can directly produce a number of different syndromes

- i. neurotoxicity leading to a descending paralysis
- ii. defibrinating coagulopathy (Venom induced consumptive coagulopathy -VICC)
- iii. anticoagulant coagulopathy
- iv. myolysis (major elevations in Creatinine Kinase –CK – may lead to renal failure).

There are five (5) principal snake genera:

- Brown (*Pseudonaja*).
- Tiger (*Notechis*).
- Black (*Pseudechis*).
- Taipan (*Oxyuranus*).
- Death Adder (*Acanthophis*).

Only 50% of snakebites results in an envenomation syndrome

Complications from envenoming may be:

- i. bleeding
- ii. ventilatory failure (from progressive paralysis)
- iii. renal impairment / failure
- iv. haemolysis and thrombocytopenia. (Thombotic microangiopathic anaemia).

3. Guideline

Approach to Snakebite

Pre-hospital:

First Aid

Pressure Bandage Immobilisation (PBI).

- i. Elasticated compression bandage wound over the bite site and up and down the whole limb.
- ii. Immobilise the limb and the patient. Splint the limb for optimal immobilisation.
- iii. If the PBI applied prior to arrival is inadequate additional bandages should be applied.
- iv. This must not be removed until the patient is in the hospital that will provide definitive treatment for the snakebite. Keep in place until the patient has been fully assessed and shown no objective evidence of envenoming (normal physical examination and laboratory investigations).

Transport

Initial transport should be to a hospital or health service with access to a doctor, either on site or via ETS.

Initial assessment and treatment can commence in patients who are symptomatic at these sites prior to transport to a hospital that meets all of the following criteria:

- i. doctor willing and able (with support) to manage snakebite
- ii. laboratory facilities capable of operating all hours
- iii. adequate antivenom stocking for applicable snakes.

In Hospital (see above):

1. Call for assistance
2. Resuscitation if required.
3. All patients with a suspicion of snakebite, must be admitted for clinical and biochemical assessment for work up of potential envenomation. Biochemical assessment requires onsite laboratory services.
4. Determine if the patient is envenomed.
 - i. **Clinical:** Sudden collapse, local effect (pain, swelling, bruising), systemic symptoms (nausea, vomiting, abdominal pain, headache), signs of neurotoxicity with ptosis, weakness

- ii. Biochemical / Laboratory: VICC, anticoagulant coagulopathy, rhabdomyolysis, renal failure.

Point of Care INR equipment cannot be used for this assessment of coagulopathy.

Toxicologist advice should be sought for all patients who have clinical or biochemical signs and symptoms of envenomation

- Call PIC on 13 11 26. OR
 - Clinical Toxicology Service in adult tertiary hospitals.
5. Assessment is performed serially (hourly) over at least 12 hours using the MR140S WACHS Snakebite Observation Chart, age appropriate Observation and Response Chart and MR149 Neurovascular Observation Chart.

- 1) Examination: Evidence of bleeding and/or neurological weakness (especially ptosis, ophthalmoplegia, facial and bulbar muscles)
- 2) Laboratory Tests: Performed on arrival and if normal then at one (1) and six (6) hours following bandage removal then 12 hours post bite.

Full Blood Picture (FBC), Urea, Creatinine and Electrolytes (U&E), Creatinine Kinase (CK), Coagulation profile (INR, aPTT, Fibrinogen, D-Dimer).

For patients without signs of envenomation (non-envenomed arm of the flow chart), the 6 and 12 hour blood tests can be delayed and processed during daylight hours.

6. Determine the type(s) of antivenom required. This is based on geography, clinical and laboratory features after discussion with a clinical toxicologist
7. Administer the dose of the required antivenom.
 - i. Dilute in 500ml sodium chloride 0.9%
 - ii. Give intravenously over 20 minutes.
 - iii. Brown snake, Tiger snake and polyvalent antivenom may be given as a rapid IV push if the patient is haemodynamically unstable or in cardiac arrest.
 - iv. Where TWO antivenoms are being administered these may be added to the same bag for administration.
 - v. Antivenom should be administered in a location where anaphylaxis management and resuscitation is available.
8. Adjuvant supportive care and serial blood tests are required every 6-8 hours following antivenom until clinical and biochemical improvement occurs.

4. Definitions

ETS	Emergency Telehealth Service
Envenoming	Clinical syndrome of systemic toxicity from venom
Antivenom	An antitoxin specific for an animal or insect venom (Stedman's Medical Dictionary 28 th Ed. 2006)
Hospital	Hospital or other health facility with emergency service capabilities.
Neurotoxicity	In snakebite, the loss of function to nerves supplying muscles.
Paralysis	Loss of power of a voluntary muscular contraction (Macquarie dictionary)
Coagulopathy	Impairment of the blood's ability to clot.
PBI	Pressure Bandage Immobilisation
PIC	Poison Information Service
VICC	Venom Induced Consumptive Coagulopathy

5. Roles and Responsibilities

Medical and nursing staff are responsible for ensuring the following:

Pre Hospital / Nursing Post:

- Basic resuscitation and assessment of the patient (Ref 1)
- Treatment of the snakebite patient according to the role of the hospital.

Transport:

- The **medical practitioners** at the site or the **ETS clinician** are responsible to ensure the patient is transported as soon as possible to a hospital which can provide definitive care (section 2.4 and 3.0)
- The **medical practitioner** is to ensure that the transfer is clinically safe, responsive, efficient and effectively coordinated in line with the [WACHS Assessment and Management of Interhospital Patient Transfers Policy](#).
- **Nursing and medical staff** are to ensure all relevant documentation is completed and accompanies the patient to the next destination.

Hospital:

- Ensure that adequate supplies of antivenom are available according to the antivenom distribution list.
- Ensure resuscitation equipment, elastic pressure bandages, splints and other supplies required are available
- Ensure local staff are aware of this policy, location of the relevant antivenom and are trained to respond to a suspected snakebite.

6. Hospitals in WACHS with Pathology Services equipped to Assess Snakebite

- a. Kimberley
 - a. Broome Hospital
 - b. Derby Hospital
 - c. Kununurra Hospital
- b. Pilbara
 - a. Port Hedland Hospital
 - b. Karratha Hospital
- c. Midwest
 - a. Carnarvon Hospital
 - b. Geraldton Hospital
- d. Wheatbelt
 - a. Northam Hospital
 - b. Narrogin Hospital
- e. Goldfields
 - a. Kalgoorlie Hospital
 - b. Esperance Hospital
- f. South West
 - a. Bunbury Hospital
 - b. Busselton Hospital
 - c. Warren Hospital (Manjimup)
 - d. Collie Hospital
- g. Great Southern
 - a. Albany Hospital
 - b. Katanning Hospital

Note all other hospitals, health services and nursing posts with ETS support have access to empiric AV appropriate for the local snake population that should be administered to symptomatic patients following the advice and support from the ETS and the Clinical Toxicologists.

General principles of empiric AV distribution:

1. South West and Great Southern region
 - a. Tiger and Brown AV
2. All other areas in WA except in the Kimberleys and near Kalgoorlie
 - a. Brown and Black AV
3. Kimberley area and near Kalgoorlie where Taipans are found
 - a. Polyvalent AV

Note: The empiric AV stocks are based on the geographic distribution of the snakes most likely to cause early toxicity. Although Death Adders exist in most areas in WA, the AV was not included in the distribution. Bites are infrequent due to the nocturnal habits of death adders, envenomation is rare and the onset of toxicity is slow. Death Adder envenomation can be managed with good supportive care pending transfer to a facility with antivenom stock.

7. Compliance

Failure to comply with this policy document may constitute a breach of the WA Health Code of Conduct (Code). The Code is part of the [Employment Policy Framework](#) issued pursuant to section 26 of the [Health Services Act 2016](#) (HSA) and is binding on all WACHS staff which for this purpose includes trainees, students, volunteers, researchers, contractors for service (including all visiting health professionals and agency staff) and persons delivering training or education within WACHS.

WACHS staff are reminded that compliance with all policies is mandatory.

8. Records Management

All WACHS corporate records must be stored in the approved Electronic Documents and Records Management System.

[Records Management Policy](#)

[Health Record Management Policy](#)

9. Evaluation

A register is to be maintained for all snakebite envenomation cases and information taken from the time of snakebite up till discharge must be recorded. This register is maintained by the Australian Snakebite Project.

The reason for restocking antivenom to sites should be recorded in the WACHS data collection tool – [WACHS Antivenom Replacement Register](#). Email confirmation of the data entry should be forwarded to the regional pharmacy department prior to reordering the stock.

Key performance indicators will include:

- Morbidity and mortality rate of snakebite victims.
- Measure of knowledge and responsibilities of attending staff towards snakebite cases.
- Cost and wastage of antivenom stock in WACHS.

10. Standards

[National Safety and Quality Health Service Standards](#) (Second edition 2017) - 1.7, 1.27, 4.13, 8.4, 8.5, 8.6, 8.8, 8.9, 8.10, 8.11

11. References

1. Murray, L., Daly, F., Little, F. and Cadogan, M. (2010). *Toxicology Handbook*. Elsevier, Sydney.
2. Isbister, Geoffrey 2006, Snakebite: A current approach to management, *Australian Prescriber*, 29(5), p125-129.

3. Stewart, Carmel 2003, Snakebite in Australia: first aid and envenomation management, *Accident and emergency Nursing*, 11, p106-111.
4. Isbister, Geoffrey. Brown, Simon. MacDonald, Ellen. White, Julian and Currie, Bart 2008, "Current use of Australian snake antivenoms and frequency of immediate-type hypersensitivity reactions and anaphylaxis", *Medical Journal of Australia*, vol 188, 8, p.473-476.

12. Related Forms

WACHS

[MR140A Adult Observation and Response Chart \(A-ORC\)](#)

[MR140F Paediatric Observation and Response Chart \(P-ORC 3-12 months\)](#)

[MR140G Paediatric Observation and Response Chart \(P-ORC 1-4 years\)](#)

[MR140H Paediatric Observation and Response Chart \(P-ORC 5-11 years\)](#)

[MR140I Paediatric Observation and Response Chart \(P-ORC 12+ years\)](#)

[MR140S Snakebite Observation Chart](#)

[MR149 WACHS Neurovascular observation chart](#)

13. Related Policy Documents

[WACHS Assessment and Management of Interhospital Patient Transfers Policy](#)

14. Policy Framework

[Clinical Governance, Safety and Quality](#)

15. Appendices

Appendix 1 - [Suspected Snakebite Flowchart](#)

Appendix 2 – [Standard stockholding of antivenoms in WACHS](#)

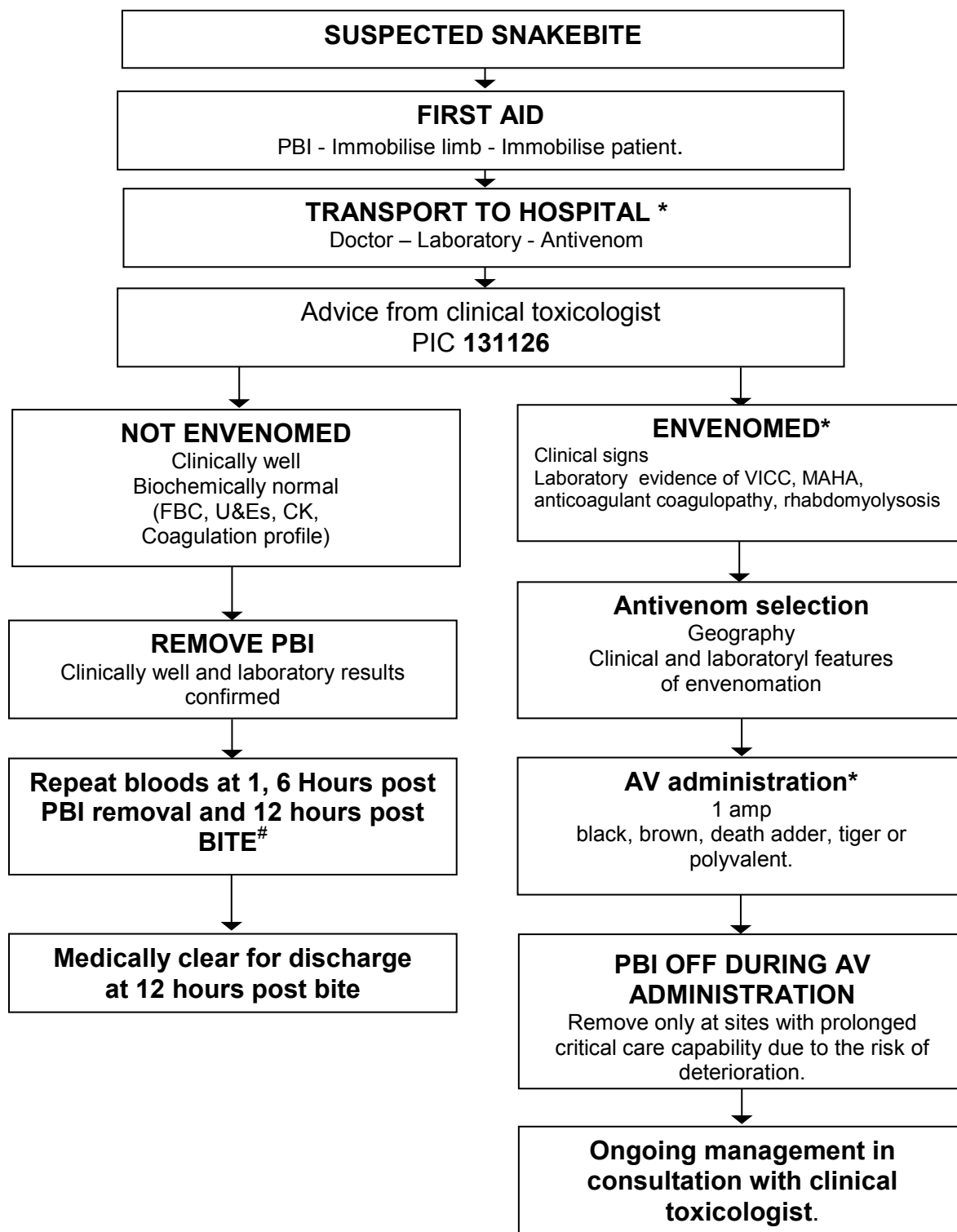
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Appendix 1 – Suspected Snakebite Flowchart



*Treatment with antivenom may occur at sites with ETS or senior medical support on the advice of toxicology or PIC prior to transport to hospitals with laboratory support. Do not remove the PBI until laboratory support is available.

The recommended timing of the 6 and 12 hour blood tests post removal of the PBI can be delayed in the WELL non- envenomed patient. The bloods can be held and processed during daylight hours

Appendix 2: Standard Stockholding of Antivenoms in WACHS

This stock holding is the intended level. Due to delays in restocking, antivenom may be temporarily unavailable due to use or damaged from a cold chain breach.

Region	Hospital	SNAKE				
		BROWN	BLACK	TIGER	POLYVAL	DEATH ADDER
Goldfields	Kalgoorlie Hospital	4	4		2	2
Goldfields	Esperance Emergency	2	1	2		1
Goldfields	Kambalda Health Centre	1	1			
Goldfields	Laverton Hospital	1	1			
Goldfields	Leonora Hospital	1	1			
Goldfields	Menzies Health Centre	1	1			
Goldfields	Norseman Hospital	1	1			
Great Southern	Albany Hospital	4		4		
Great Southern	Bremer Bay NP	1		1		
Great Southern	Denmark Hospital	1		1		
Great Southern	Gnowangerup Hospital	1		1		
Great Southern	Jerramungup NP	1		1		
Great Southern	Katanning Hospital	2		2		1
Great Southern	Kojonup Hospital	1		1		
Great Southern	Plantagenet Hospital	1		1		
Great Southern	Ravensthorpe Hospital	1		1		
Kimberley	Broome Hospital	4	4		4	2
Kimberley	Derby Hospital	2	2		1	1
Kimberley	Fitzroy Cross Hospital	1			1	
Kimberley	Halls Creek Hospital	1			1	
Kimberley	Kununurra Hospital	2	2		2	1
Kimberley	Wyndham Hospital	1			1	
Midwest	Geraldton Pharmacy	3	2			1
Midwest	Carnarvon Hospital	2	2			1
Midwest	Coral Bay NP	1	1			
Midwest	Cue	1	1			
Midwest	Dongara Hospital	1	1			
Midwest	Exmouth Hospital	2	2			1
Midwest	Kalbarri NP	1	1			
Midwest	Meekatharra Hospital	1	1		1	
Midwest	Morawa Hospital	1	1			
Midwest	Mt Magnet Health Centre	1	1			
Midwest	Mullewa Hospital	1	1			
Midwest	Northampton Hospital	1	1			
Midwest	North Midlands (Three Springs)	1	1			
Midwest	Yalgoo NP	1	1			

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Region	Hospital	BROWN	BLACK	TIGER	POLYVAL	DEATH ADDER
Pilbara	Port Hedland Hospital	4	4			2
Pilbara	Karratha Health Campus	2	2			2
Pilbara	Marble Bar NP	1	1			
Pilbara	Newman Hospital	1	1			
Pilbara	Nullagine NP	1	1			
Pilbara	Onslow Hospital	1	1			
Pilbara	Paraburdoo Hospital	1	1			
Pilbara	Roebourne Hospital	1	1			
Pilbara	Tom Price Hospital	1	1			
South West	Bunbury Hospital	4		4		1
South West	Busselton Hospital	2		2		
South West	Augusta Hospital	1		1		
South West	Boyup Brook Hospital	1		1		
South West	Bridgetown Hospital	1		1		
South West	Collie Hospital	1		1		
South West	Donnybrook Hospital	1		1		
South West	Harvey Hospital	1		1		
South West	Margaret River Hospital	1		1		
South West	Nannup NP	1		1		
South West	Northcliffe NP	1		1		
South West	Pemberton Hospital	1		1		
South West	Warren Hospital (Manjimup)	2		2		
Wheatbelt	Narrogin Hospital	3	2	1		2
Wheatbelt	Northam Hospital	5	1	1		1
Wheatbelt	Merredin Hospital	1	1			
Wheatbelt	Moora Hospital	1	1			
Wheatbelt	Beverley MPS	1	1			
Wheatbelt	Boddington Hospital	1	1	1		
Wheatbelt	Bruce Rock Hospital	1	1			
Wheatbelt	Corrigin MPS	1	1			
Wheatbelt	Cunderdin NP	1	1			
Wheatbelt	Dalwallinu MPS	1	1			
Wheatbelt	Goomalling Hospital	1	1			
Wheatbelt	Jurien Bay NP	1	1	1		
Wheatbelt	Kellerberrin Hospital	1	1			
Wheatbelt	Kondinin Hospital	1	1			
Wheatbelt	Kununoppin Hospital	1	1			
Wheatbelt	Lake Grace Health Centre	1	1			

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Region	Hospital	BROWN	BLACK	TIGER	POLYVAL	DEATH ADDER
Wheatbelt	Pingelly Hospital	1	1			
Wheatbelt	Quairading Hospital	1	1			
Wheatbelt	Southern Cross Hospital	1	1			
Wheatbelt	Wagin Hospital	1	1			
Wheatbelt	Wongan Hills MPS	1	1			
Wheatbelt	Wyalkatchem Hospital	1	1			
Wheatbelt	York Hospital	1	1			

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