



PNG Snakebite Partnership

Managing Sea Snake Envenomation

Overview and Geographic Distribution

((I) Sea Snakes

Sea snakes (subfamily *Hydrophiinae*, family *Elapidae*) are closely related to Australian terrestrial elapids, such as taipans and brown snakes. They are highly venomous but rarely aggressive, with most bites occurring during fishing activities when snakes become entangled in nets. Sea snakes inhabit marine environments in tropical and subtropical Indo-Pacific waters, especially coastal areas, estuaries, and reefs.

The most reported species in this region is *Hydrophis zweifeli* (beaked sea snake) – see Picture A. Other species include:

- *Laticauda* species (sea kraits – semi-aquatic) – Picture B
- *Aipysurus laevis* (olive sea snake) – Picture B
- *Enhydrina schistosa*, considered the primary cause of sea snake envenomation, is predominantly found in the Bay of Bengal, the Malayan Peninsula, and northern Australia.



A.



B



C

2. Envenomation

(I) Sea Snakes

Sea snake venom is highly toxic and primarily contains:

- **Myotoxins:** Cause rhabdomyolysis and muscle cell death.
- **Neurotoxins:** Both pre- and post-synaptic; human effects remain unclear.
- **Cytotoxins/Hemolysins:** These play a minor role in clinical symptoms.

Venom disrupts muscle membranes, causing leakage of enzymes, myoglobin, and potassium into the bloodstream. Clinical deterioration occurs more rapidly than with terrestrial (land) snakes, with patients potentially going into cardiac and respiratory arrest within 30 minutes.

3. Clinical Features- Stages of envenomation:

Sea Snake Envenomation

Stage	Timeframe	Symptoms
Initial	Within hours	- Mild local effects: bite site often painless and barely noticeable- Generalized muscle pain and stiffness within 30 mins to 1 hour- Weakness begins within 2–4 hours,

		progressing to difficulty in movement
Progression	4–24 hours	- Severe muscle destruction (rhabdomyolysis): venom attacks skeletal muscle, causing swelling and muscle breakdown- Myoglobinuria: dark-coloured urine due to myoglobin in blood- Kidney damage: acute tubular necrosis and potential renal failure
Later stages	48+ hours	- If untreated: death from renal failure due to hyperkalaemia (excess potassium)- Survivors: muscle regeneration in weeks; some may develop muscle fibrosis (scarring)

Common features:

- Mild local swelling or bruising
- Myalgia and elevated creatine kinase (CK)
- No neurotoxicity observed in recent clinical studies²

4. First Aid and Pre-hospital Care

Sea Snake Bites:

- Danger, Response, Airway, Breathing, Circulation protocol
- Pressure Immobilization Bandage (PIB)
- Immobilise patient and monitor for respiratory distress

5. Psychological First Aid & Communication

Psychological first aid & patient communication

- Managing Patient Anxiety & Fear
 - Many victims experience panic due to paralysis or severe pain
 - Techniques for calming patients (reassurance, breathing exercises)

- Community Education:
 - Safe practices to prevent bites- avoid handling, do not attempt to kill snake
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6. Hospital Management

(I) Sea Snake

If there is evidence of systemic envenomation from a sea snake, administer one vial (1,000 units) slowly by intravenous infusion after dilution with Hartmann's solution or normal saline. Once diluted, sea snake antivenom should be used immediately.

Do not store diluted antivenom.

Antivenom Dosing:

- Initial dose: 3,000–4,000 units IV (up to 10,000 units if required)
- Dilute 1:10 in Hartmann's or 0.9% saline and administer over 30 minutes
- Prepare adrenaline for possible anaphylaxis

Indications:

- Clinical evidence of envenomation, including neurotoxicity (e.g., paralysis and respiratory failure)
- Laboratory evidence of myotoxicity within 6 hours of the bite

Contraindications:

- No absolute contraindications
- Increased risk of anaphylaxis in patients previously treated with antivenom or those with known equine serum allergy

Administration Guidelines:

- Administer antivenom in a monitored setting where anaphylaxis can be managed
- Use 1 ampoule diluted in 500 mL of 0.9% saline IV over 20 minutes
- The dose is the same for adults and children (snakes do not inject less venom into children)

If there is progressive neurological deterioration, administer 3 ampoules of antivenom. While one ampoule is often sufficient to halt paralysis, careful observation is essential following the initial dose. Monitor with spirometry and peak flow measurements.

In unstable patients or cardiac arrest, antivenom may be given as a rapid IV push.

Early administration of sea snake antivenom appears to reduce muscle damage if given within 6 hours of the bite².

Supportive Care Includes^{3,4,5}

- IV fluids – to prevent kidney failure
- Dialysis – if renal damage is severe
- Pain management and muscle rehabilitation
- Monitor breathing, oxygen saturation, and vital signs
- Prepare for mechanical ventilation if paralysis occurs

Monitoring:

- Urine output and colour (for signs of myoglobinuria)
- CK and renal function (due to risk of renal failure)

Adverse drug reactions:

- Anaphylaxis: Cease antivenom infusion, treat as per anaphylaxis with oxygen, IV fluids and IM adrenaline. Recommence antivenom infusion when anaphylaxis has resolved. Rarely will ongoing administration of adrenaline be required to complete the antivenom infusion.
- Serum Sickness: A benign and self-limiting complication occurs 5-10 days after antivenom; symptoms include fever, rash, arthralgia, and myalgia. Oral steroids for 5 days may ameliorate symptoms (e.g., prednisolone 50mg/day in adults and 1mg/kg in children). All patients who receive antivenom should be warned about this complication.

7. Complications & Long-term Care

- Sea snake: Respiratory failure, renal injury
 - Stonefish: Secondary infection, delayed healing
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8. Risk Factors

High-risk groups: Fishermen, divers, and healthcare workers in coastal regions

Seasonal factors: Increased envenomation during monsoon and fishing seasons

10. Differential Diagnosis

Sea Snake vs. Land Snake:

- Sea snakebites are often painless, with no fang marks

Stonefish vs. Other Fish:

- Stonefish cause more intense systemic symptoms
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11. Emergency Contact

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