

Store this Flipper Card in your Resuscitation Trolley
or Emergency Department

SNAKEBITE

FLIPPER CARD



HOSPITAL
CARE
PROVIDER

SNAKES
OF
ESWATINI



eswatini
antivenom
foundation

This Flipper Card gives you all the general guidelines to treat
a snakebite as an In-Hospital Provider

ASSESSING THE SNAKEBITE

INITIAL ASSESSMENT

- **Scene Safety** - Ensure that the snake (if brought in) is securely contained.
- **Trauma principles are used in snakebite: ABCDE Provide supplemental oxygen, connect to monitors (Oxygen saturation, ECG and blood-pressure) and consider insertion of an intravenous line.**
- **Pressure Bandages** - Ensure adequate circulation is present in the distal point of the limb. Do not remove in suspected neurotoxic (progressive weakness) bites, until ready to administer antivenom where indicated.
- **TOURNIQUETS:** Do not remove in suspected **NEUROTOXIC BITES** (progressive weakness). In all other cases remove as soon as possible. **FOR NEUROTOXIC BITES:** If an improvised tourniquet is in place, **REPLACE** it with an **INFLATABLE TOURNIQUET ABOVE** the improvised one. Once the inflatable tourniquet is **INFLATED TO 10mmHg ABOVE THE SYSTOLIC BLOOD PRESSURE, THEN, REMOVE** the improvised tourniquet. **PROCEED** to do a **STAGED RELEASE. STAGED RELEASE: DEFLATE THE TOURNIQUET GRADUALLY AT 5-10mmHG EVERY 3 - 5 MINUTES. THIS SHOULD BE DONE SIMULTANEOUSLY WITH THE ADMINISTRATION OF THE ANTIVENOM OVER 30 MINUTES.**

VITALS

- Heart Rate
- Temperature
- Blood Pressure
- Glucose
- ETCO₂ if intubated – prep if intubation needed
- PEAK flow
- Respiratory Rate
- Skin condition
- SpO₂
- Assess GCS
- ECG monitoring
- Do 20WBCT, FBC, INR and Urea/Creat/Elect

PHYSICAL EXAMINATION

- Fang marks – absence of fang marks does not rule out snakebite.
- Signs and Symptoms – Progressive weakness: **Ps** Paralysis, Ptosis, Paraesthesia, **Ss** Sweating, Salivation, Slurred speech. Painful progressive swelling: Swelling, blisters, skin discoloration, Bleeding, etc.
- Signs of Respiratory Distress or Shock?

HISTORY

SAMPLE

- How did the bite occur?
- Where on the body was the patient bit?
- How long has it been since the snakebite?
- Is there an identification/description of the snake? [Have a poster in your emergency department]
- What activity was performed at the time of the bite and what treatment was given?
- Has the patient sustained a snakebite before?

EMERGENCY CONTACT NUMBERS

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PLEASE REFER TO YOUR LOCAL EMERGENCY EXPERT CONTACTS

Guideline Only/Not a Substitute for Clinical Judgement

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SNAKEBITE SYNDROMES

PAINFUL PROGRESSIVE SWELLING (PPS)

- Swelling due to cytotoxic venom starting at the bite site and progressing up the limb.
- Immense pain with the affected area being warm and hard.
- Complications include: blistering, discoloration, bleeding under the skin, necrosis, pseudo compartment syndrome, nerve and vessel entrapment, deep vein thrombosis, hypotension, and hypovolaemic shock. True compartment syndrome is rare in snakebite.
- **SPECIES RESPONSIBLE:** Snouted Cobra, Puff Adder, Mozambique Spitting Cobra (VO) , Rinkhals (VO), Stiletto Snakes and Night Adders
VO = Venom Ophthalmia

PROGRESSIVE WEAKNESS (PW)

- Progressive weakness and paralysis due to neurotoxic venom.
- This syndrome can lead to complete paralysis, respiratory failure and cardiac arrest.
- Complications include: muscle spasms, drooling, incontinence, salivation, lacrimation, diaphoresis, dilated pupils, dyspnoea, respiratory failure and death.
- **SPECIES RESPONSIBLE:** Black Mamba, Snouted Cobra, Rinkhals (VO)
VO = Venom Ophthalmia

BLEEDING (B)

- History may include need for the snake to be “pulled off” the bite site.
- Bleeding tendencies are caused by haemotoxic venom leading to a venom induced consumption coagulopathy (VICC) that develops over time.
- Early symptoms are usually absent. This is followed by bleeding at the bite-site and bruising and a prolonged 20-minute whole blood clotting time.
- This syndrome eventually leads to widespread internal bleeding.
- Later complications include: Haematuria, haemoptysis, melena, epistaxis, cerebral haemorrhage, hypotension, and hypovolaemic shock. (12-36 hours).
- **SPECIES RESPONSIBLE:** Boomslang, Vine Snake, Puff Adder

MIXED PAINFUL PROGRESSIVE SWELLING & BLEEDING (PPS & B)

- Mix of complications from the Painful Progressive Swelling as well as Bleeding Syndromes.
- **SPECIES RESPONSIBLE:** Puff Adder

MIXED PAINFUL PROGRESSIVE SWELLING & PROGRESSIVE WEAKNESS (PPS & PW)

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- **SPECIES RESPONSIBLE:** Snouted Cobra, Rinkhals (VO)
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AIRWAY AND BREATHING

Assess imminent respiratory compromise (respiratory rate, SpO₂, and signs of shock) (**C-spine is usually not an issue**) **Supplemental oxygen with nasal prongs ± a non-rebreather mask for SpO₂ less than 94%** Simple airway manoeuvres and bag-valve-mask (BVM) ventilation with 100% oxygen should be provided to apnoeic patients or patients suffering from hypoventilation.

EARLY INTUBATION WITH BOUGIE

RSI

Optimise preparation (equipment and patient) and pre-oxygenation

Laryngoscopy with video or bronchoscopic assistance (2-3 attempts)

Alternative Airway

LMA, LTA, iGel

Surgical Airway

Last resort should other options fail

RSI MEDICATION

mg/kg	INDUCTION
1-2	Ketamine
0.1-0.3	Etomidate
mg/kg	NEUROMUSCULARBLOCKER
1-2	Suxamethonium - AVOID
1-1.2	Rocuronium - only if needed

BASELINE VENTILATOR SETTINGS

Mode	SIMV
Tidal Volume	7ml/kg
PIP	12-14cm H ₂ O
PEEP	5
I:E	1:2
Rate	12bpm (adults), 20bpm (paediatrics), 25bpm (neonates)

POST INTUBATION CHECKLIST

- ETT secured at correct depth
- ETCO₂ Monitor attached
- Ventilator set & attached
- Analgesia administered
- Sedation administered
- Vital signs rechecked
- ETT cuff pressure checked
- Analgosedation infusion prep:
(Ketamine 500mg./50ml Titrate to effect at around 1-2/kg/hr
AVOID Morphine and Midazolam)
Functional IV line for resuscitation

CIRCULATION / BLEEDING

Shock is less common in the early phase but anaphylaxis to the snakebite (if previously bitten) or to the antivenom is fairly common

Fluid therapy in cases of cytotoxic bites follows the Surviving Sepsis approach of 20 - 30ml/kg crystalloid if shocked: Obtain large bore IV access or IO access. In regional facility, a rapid infusion catheter in the groin is effective. Maintenance fluid must also be given.

DISABILITY

Check the Glasgow coma score and check eyelid motor function. Assess power and swallowing capacity – if any of these are below normal airway support indicated.

DRUG THERAPY

Follow the **Syndromic Approach**. Consult a trained herpetologist to accurately identify the snake, enabling more precise decision-making.

If the need for Antivenom is confirmed, prepare the patient with a pre-dose Adrenaline 0.25mg (quarter ampoule) subcutaneous on either thigh, abdominal wall or forearm.

We advise to administer antivenom as: Cannulate IV (not on same limb)

A physician should be present during administration.

- 1. DILUTION:** Dilute each vial just before administration. Do not prepare multiple doses in advance. Reconstitute each vial with 10 ml of the provided sterile water. (10 ml of reconstituted powder)
- 2. ADMINISTRATION:**
 - 2.1 Slow IV push:1st vial:** administer **10 ml over 2 minutes**, monitoring vital signs and adverse reactions.
 - 2.2** If no adverse effects, administer remaining vials at **1 vial per minute** until all doses are given.
 - 2.3** Monitor vitals and patient response after **every** dose.
 - 2.4 INFUSION:** Add **Prescribed** dose of **antivenom** in 200 ml NACL, infuse for no more than **30 minutes** without test dosing.
Paediatric Caution: Adjust fluid volumes to prevent **fluid overload**. Monitor vitals and assess frequently.
 - 2.5** Steroids or Antihistamines should **NOT** be given routinely prior to antivenom administration.

Recommended dosing for treatment:

- **Neurotoxic bite** – 40 -120 ml of Polyvalent antivenom. (4 - 12 vials)
- **Cytotoxic bite** – 30 - 100 ml of Polyvalent antivenom. (2 - 5 vials)
- **Haemotoxic bite** – **ONLY** Boomslang: 10-20 ml **SAVP Monovalent** specific antivenom (1-2 vials)

Antivenom Dosage: The upper limit is **not fixed**. Doses may **exceed 10 vials** based on severity. Adjust as clinically indicated. **Titrate to effect.**

Patients bitten by snakes should be observed in hospital for **at least 24 hours** after the bite. For **Bleeding Syndrome Patients**, monitor for **at least 48 hours** after the bite.

Neostigmine may be considered a **therapeutic** option in the management of **rapidly** progressing **neurotoxic effects** following a confirmed **Snouted Cobra** bite, ensuring timely intervention to support respiratory function and patient stability. Neostigmine is **INEFFECTIVE** for **Black Mamba Bites**.

IN THE EVENT OF NO AVAILABILITY OF ANTIVENOM, PLEASE CARRY OUT SUPPORTIVE TREATMENT AND CONSIDER TRANSFER TO A HOSPITAL WITH ANTIVENOM.

Indications for Antivenom:

- All patients with systemic signs and symptoms or severe spreading local tissue damage should receive antivenom.
- Signs of neurotoxicity.
- Positively identified Puff Adder, Snouted Cobra, Mozambique Spitting Cobra, Rinkhals bite **AND** evidence of severe progressive Cytotoxicity.
- Unidentified snakebites and evidence of severe progressive cytotoxicity envenomation, i.e.:
 - **swelling of whole hand or foot within 1 hour**
 - **swelling of the whole limb in < 12 hours**
 - swelling to the knee or elbow in < 6 hours (or two joints above bite site in 6 hrs)
 - **swelling progression > 5cm per hour**
 - **discoloration of the skin / necrosis at the bite-site**
 - **threatened airway due to swelling**
- evidence of complication, e.g. compartment syndrome – must get AV before surgery
- thrombocytopenia or raised INR / abnormal TEG/ROTEM
- positively identified Boomslang bite – do not wait for onset of VICC

EYE CARE

- Flush affected eye/eyes with a bland liquid, 0.9% Sodium Chloride solution preferred.
- If a local anaesthetic agent is available add 2% lignocaine 1ml per 1000ml saline.
- Add a mydriatic eye drop in cases where corneal damage is noted.
- Refer to an ophthalmologist.
- Do a slit lamp fluorescein check for corneal damage and cover with antibiotic drops for 5/7.

SNAKEBITE AND ANTIVENOM IN PAEDIATRICS

- **Dose of antivenom administered in PAEDIATRICS is the same as for adults**
- Antivenom is designed to neutralize a fixed venom dose, which the snake injects indiscriminately into humans large or small, including neonates.
- Higher doses of venom is relative to their body weight compared to adults.
- Venous access may be difficult, Intraosseous route may be required.
- Coagulopathies occur sooner as does weakness and respiratory failure due to a faster evolution of envenomation.
- Frequent reassessment of snake bitten children is necessary.

SNAKEBITE AND ANTIVENOM IN PREGNANCY

- **Antivenom is NOT contraindicated in pregnancy.**
- Indications for antivenom administration remain the same as with non-pregnant patients.
- Snakebite envenomation increases the chance of foetal loss in first and early second trimester.
- Envenomation can cause foetal bradycardia in viable gestation pregnancies - thus foetal monitoring is indicated.
- Envenomation by haemotoxic snakebite may increase the chance of bleeding complications such as antepartum and postpartum haemorrhage.

SNAKEBITE AND ANTIVENOM IN THE ELDERLY

- **The Elderly are no different than younger patients when it comes to the administration of antivenom for snakebite.**
- May be more prone to hypotension.
- Therapeutic fluid overload and adverse effects of adrenaline (epinephrine) and are more likely from intercurrent and unrelated chronic illnesses such as hypertension, cardiovascular diseases, chronic obstructive bronchitis, and diabetes mellitus.

DISCLAIMER: The HOSPITAL CARE PROVIDER Flipper Card has been adapted by The Eswatini Antivenom Foundation, drawing from the latest evidence-based practices outlined in Snakebite Management: Eswatini Antivenom Foundation Guidelines and South African Consensus Guidelines 2022, updated 2023(SASS).

The authors and editor have exerted every effort to ensure that the clinical procedures and recommendations described herein are based on current knowledge and state-of-the-art information obtained from acknowledged authorities, texts and journals. However, they cannot be considered absolute and universal recommendations. Each patient's situation must be considered individually, using a SYNDROMIC approach. The reader is urged to check the package inserts of drugs and equipment and the manufacturer's recommendations for indications, contraindications, proper usage, warnings and precautions before use. The authors and editor disclaim responsibility for any adverse effects resulting directly or indirectly from information presented in this booklet, undetected errors or misunderstandings by the readers.

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POLYVALENT ANTIVENOM SPECIES

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BLACK MAMBA (*Dendroaspis polylepis*)

- **Distribution:** Eswatini
- **Colour:** Dark Olive, greyish brown, gunmetal grey
- **Length:** 2.8-3.2m up to 4.5m
- **Venom:** **Highly Neurotoxic**
- **Syndrome:** **PW**
- **Venom Effects:** Progressive Weakness & Paralysis with or without minor swelling



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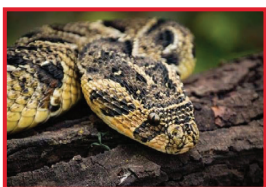


SNOUTED COBRA (*Naja annulifera*)

- **Distribution:** Eswatini
- **Colour:** Yellowish brown with a yellow belly, or black & cream bands
- **Length:** 1.8-2.5m
- **Venom:** **Predominantly Cytotoxic & Mildly Neurotoxic**
- **Syndrome:** **PPS & PW**
- **Venom Effects:** Painful Progressive Swelling, Progressive Weakness & Paralysis

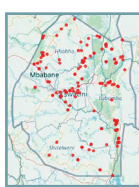


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PUFF ADDER (*Bitis arietans*)

- **Distribution:** Eswatini
- **Colour:** Colour varies, V-shaped markings down the back pointing towards the tail
- **Length:** 0.9-1.2m up to 1.4m
- **Venom:** **Predominantly Cytotoxic & Mildly Neurotoxic**
- **Syndrome:** **PPS & B**
- **Venom Effects:** Painful Progressive Swelling & Bleeding

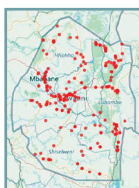


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MOZAMBIQUE SPITTING COBRA (*Naja mossambica*)

- **Distribution:** Eswatini
- **Colour:** Brown with an orange/salmon belly & black bands on the neck
- **Length:** 1.2-1.6m
- **Venom:** **Cytotoxic**
- **Syndrome:** **PPS**
- **Venom Effects:** Painful Progressive Swelling



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RINKHALS (*Hemachatus haemachatus*)

- **Distribution:** Eswatini
- **Colour:** Black, brown or olive with white throat bands or black & yellow/orange body bands with yellow throat bands
- **Length:** 1.0-1.5m
- **Venom:** **Predominantly Cytotoxic & Mildly Neurotoxic**
- **Syndrome:** **PPS & PW**
- **Venom Effects:** Painful Progressive Swelling, Progressive Weakness & Paralysis



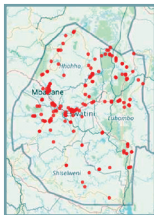
MONOVALENT ANTIVENOM SPECIES

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BOOMSLANG (*Dispholidus typus*)

- **Distribution:** Eswatini
- **Colour:** Grey, Brown, Green, Red, Blue, Green with Black "bands", black backs with yellow bellies
- **Length:** 1.5-2.0m
- **Venom:** **Haemotoxic**
- **Syndrome:** **B**
- **Venom Effects:** Bleeding



OTHER VENOMOUS SPECIES

Even though localized symptoms could seem extreme, there is no antivenom for the treatment of vine, stiletto and night adder bites

© Neville Games



VINE SNAKE (*Thelotornis capensis*)

- **Distribution:** Eswatini
- **Colour:** Cryptically coloured resembling a stick
- **Length:** 1.2-1.5m
- **Venom:** **Haemotoxic**
- **Syndrome:** **B**
- **Venom Effects:** Bleeding



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RHOMBIC NIGHT ADDER (*Causus rhombeatus*)

- **Distribution:** Eswatini
- **Colour:** Dark brown Rhombic markings on the back. Body colour varies from light grey to brown. Characteristic "V" shape marking on the head
- **Length:** 1.40-60cm, max 1m
- **Venom:** **Cytotoxic**
- **Syndrome:** **PPS**
- **Venom Effects:** Moderate local swelling & pain



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BIBRON'S STILETTO (*Atractaspis bibronii*)

- **Distribution:** Eswatini
- **Colour:** Body brown to blackish, belly may be white
- **Length:** 40-60cm, max 98cm
- **Venom:** **Cytotoxic**
- **Syndrome:** **PPS**
- **Venom Effects:** Moderate swelling with potential of causing local tissue necrosis

