Initial Assessment

All patients presenting with snakebite should be admitted to hospital for assessment, observation and treatment if necessary.

If in shock, resuscitate. Check:-

a) **Circulation** - Assess the state of the circulation by measuring the pulse rate and the blood pressure. Establish IV access, infuse with normal saline. If there is circulatory inadequacy as indicated by hypotension and a rapid, weak pulse -

Give an intravenous saline push (isotonic saline 20 ml/kg body weight as an intravenous bolus); if still hypotensive, repeat the same dose once more;

b) **Airway** – maintain a clear airway;

c) **Breathing** - assess and support: check the adequacy of ventilation. A weak cough signifies respiratory muscle paralysis and inadequate ventilation. Immediate intervention is mandatory -

ventilate with Ambu bag and mask, or via endotracheal tube.

See SNAKEBITE IN CHILDREN for notes on monitoring of breathing in children.

Evidence of Envenoming

Do a full clinical examination to demonstrate evidence of envenoming. Are there:

a) **local effects** – such as swelling, blistering, tissue necrosis;

b) **signs of neurotoxicity** – such as ptosis, external ophthalmoplegia, limb or respiratory muscle paralysis;

c) **signs of coagulopathy** – such as a bleeding tendency with spontaneous systemic bleeding.

ASSESS COAGULOPATHY BY PERFORMING THE 20 MINUTE WHOLE BLOOD CLOTTING TEST (20WBCT)

The presence of coagulopathy and neurotoxicity indicates systemic envenoming. The pattern of systemic effects (coagulopathy and neurotoxicity) together with local effects gives an indication of the offending snake (see table *Summary of Selected Manifestations* below).
The presence of muscle movement pain and myoglobinuria (passing deep-red wine-coloured urine) indicates rhabdomyolysis, suggestive of envenoming by a sea snake.

Abdominal pain, Nausea, Vomiting, Hypotension and Polymorphonuclear leucocytosis are early non-specific signs

Summary of selected manifestations			
	Local Effects	**Coagulopathy**	**Neurotoxicity**
Russell's viper	++	+++	+
Cobra	+++	-	++
Krait	-	-	+++
Saw-scaled viper	++	++	-
Hump-nosed viper	++	+	-
Green pit-viper	++	+	-
Sea snake	-	-	+/- (Muscle movement Pain +++)

Mild +
Moderate ++
Severe +++

Epidemiological and circumstantial scenarios help to establish the identity of a biting snake in the event a snakebite victim presents without the implicated snake and there is no clear description of it forthcoming:

Russell's viper : Paddy field or footpath; at dawn or dusk; bites on elbow and below, knee and below
Cobra : Close to bodies of water, in and around houses; bites on elbow and below, knee and below
Krait : Victims sleeping on the floor; at night; bites anywhere from head to toe. A high incidence in the dry zone, September to December
Hump-nosed pit viper : Damp places around dwellings, sheds, in gardens, under leaf litter; bites on limb extremities
Green pit-viper : Tea pluckers & other agricultural workers; bites on limb extremities
Saw-scaled viper : Sandy, arid coastal plains; Jaffna vegetable farmers, bites on limb extremities

The 20-minute Whole Blood Clotting Test (20WBCT)

The 20-minute Whole Blood Clotting Test (20WBCT, also WBCT20) is a simple bedside procedure to assess coagulopathy following snakebite. However, it is not without its limitations.[1]

False positive results:
a "false positive" (i.e. non-clotting) 20WBCT in a patient who is not envenomed and has normal blood coagulation, results from the use of a non-glass vessel rather than ordinary (boro-silicate) glass, or a glass vessel that has been cleaned with detergent, soap or washing fluid or is wet or contaminated.

False negative results:
a "false negative" (i.e. clotting) 20WBCT may occur in patients with milder degrees of coagulopathy. The 20WBCT is less sensitive to mild depletion of fibrinogen and other clotting factors, in the early stages of evolving snake venom induced DIC and consumption coagulopathy.

In clinical practice, the WBCT20 has low sensitivity for detecting coagulopathy in snake envenoming and should not over-ride clinical assessment-based decisions about antivenom administration (Isbister et al, 2013[2])

It is recommended that the prothrombin time (PT) and the International Normalized Ratio (INR) be routinely estimated together with the 20WBCT whenever possible. Other laboratory tests such as activated partial thromboplastin time (aPPT), and fibrinogen assay may be performed, whenever these are available, if the result of the 20WBCT is inconsistent with the clinical condition of the patient.

[1] WHO (2016) Guidelines for the management of snake-bites, 2nd edition, World Health Organization 2016.

[2] Isbister GK, Maduwage K, Shahmy S, et al (2013). Diagnostic 20-min whole blood clotting test in Russell's viper envenoming delays antivenom administration. QJM; 106: 925–932. (Downloaded from http://qjmed.oxfordjournals.org/ by guest on May 15, 2013)

THE 20WBCT

The 20-minute whole blood clotting test is performed at the bedside as follows:

1. Collect 1 ml of blood into a clean, dry 5 ml boro-silicate glass test tube of internal diameter 10 mm and leave it undisturbed for 20 minutes.[3]

2. At the end of 20 mins. tilt the tube: observe whether the blood has clotted or not.

3. Conclusions

a) If the blood flows (i.e. no clot), the test is positive, there **is** coagulopathy (envenomed).

b) If the blood does not flow (i.e. clotted), the test is negative, there **is no** coagulopathy (not envenomed).

If there is any doubt about the result, either repeat the test together with a control sample or seek laboratory tests such as bleeding time and clotting time.

Caution

"However, every effort should be made to eliminate false positive (non-clotting) results by ensuring that ordinary glass is used, that recycled glass vessels are not cleaned with detergents or other cleansing fluids and that a normal control blood is used for comparison in cases where the 20WBCT result is inconsistent with the patient's clinical condition. Accepting that the 20WBCT may remain negative (clotting) in patients with evolving venom-induced DIC, the test should be repeated frequently and antivenom treatment should not be delayed if there is other evidence of antihaemostatic disturbances (e.g. spontaneous systemic bleeding distant from the bite site)."

Source: *Guidelines for the management of snake-bites*, 2nd edition, World Health Organization 2016

[3] Ratnayake Indira, Shihana F, Dissanayake D M, Buckley N A, Maduwage K, Isbister G K (2017). Performance of the 20-minute whole blood clotting test in detecting venom induced consumption coagulopathy from Russell's viper (Daboia russelii) bites. *Thrombosis and Haemostasis* 3/2017.