Medical Officers' Training Module on management of Snake bite, Animal bite and Common poisonous bites

Public Health & Communicable Diseases Branch
Department of Health & Family Welfare, Government of West Bengal

Government of West Bengal
Department of Health & Family Welfare
Swasthya Bhawan
GN-29, Sector-V, Salt Lake, Kolkata – 700 091

Preface

Snake Bite and Rabies are two important Neglected Tropical Diseases which result in numerous unfortunate casualties globally as well as in India. Timely intervention can save precious lives of snake bite and animal bite victims.

"Training Module for Management of Snake Bite & Common Poisons" that was published by this Department and disseminated among the Medical Officers in 2018, was well appreciated and accepted. Now, in 2022, the snake bite management guideline is further fine tuned with recent inputs from experts. This, along with the management guideline for animal bites, is brought out in between two covers for wide use by the Medical Officers as a practical reference material.

A section on management of poisonous insect bites is also added in order to cover up another area of felt need of the frontline MO-s.

Government of West Bengal stands committed to ensure early and rational treatment for these fatal and/or painful conditions.

I appreciate the effort of the Director, Public Health, the Public Health Programmes Branch and also the Faculties of the Medical Colleges who have contributed in updating the guidelines. I also express my gratitude towards the NTD Division of WHO for joining hands in this endeavour.

[Narayan Swaroop Nigam, IAS]
Secretary
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Dated: Kolkata,
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Foreword

This training module is a compendium of three chapters on Snake Bite, Animal Bite (Rabies Prevention) and Poisonous Insect Bites, and is meant to help the Doctors in patient management for the afore-said conditions. Amongst these, the snake bite management guideline is a result of updating & value addition upon its precursor of 2018.

The guidelines in the module serve not only as a standard reference, but also provide the treating Physicians a working principle which in some cases is not readily available in text books. The discourse on certain special situations and the FAQ section would help allay the confusion in treatment decision the Medical Officers are sometimes faced with.

While fine tuning the existing materials, inputs have been taken from subject experts and synchronization has been made with national guidelines if available.

The book is a synergy of the PH&CD Branch of the Directorate, PHP Branch of the Secretariat and valuable contributions from Faculties of Medical Colleges. Also, it has a significant back-end support from the Neglected Tropical Diseases Division of the World Health Organization.

We sincerely thank all who are behind this publication. It would be our great pleasure if the module comes to be of material help for the Doctors rendering rational treatment at the forefront.

23/08/2022

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Director of Medical Education

23/08/22.

Dr. Siddhartha Niyogi
Director of Health Services

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Dr. Sumit Poddar, President, Association for Prevention & Control of Rabies in India.

Dr. Pritam Roy, State Coordinator & Zonal Coordinators, Neglected Tropical Diseases Division of WHO-India.

National Rabies Control Programme, NCDC, Delhi.

National Protocol for Snake Bite Case Management.

CONTENT

Introduction

Morbidity and mortality due to snake bite in West Bengal is of such a magnitude that it attains the dimension of a public health problem, particularly in rural Bengal. The State Health Department is aware of the fact and it is earnest to mitigate the problem within the existing resources.

As an essential part of this mitigation approach, availability of anti-venom serum (AVS) injection has been ensured round the year in all the bedded health facilities under the Health & Family Welfare Dept. i.e. starting from the Medical College Hospitals right up to the Bedded Primary Health Centres in the remote villages.

Since practical approaches to snake bite management is not taught in the Medical Graduate curriculum, only the availability of AVS does not ensure the optimum treatment. Hence the Health Department, with active inputs from subject experts, had developed its own case management guidebook way back in 2015. With further updates & modifications a revised module was brought out in 2018. Now, with evolving experiences and further finetuning suggested by the experts, it is warranted to update the module again and that is why this present version comes up.

However, capacity building of the HR needs to take into account not only the length & breadth of the State, but the attrition issuehas also to be factored in. So, this time – with the new module in the repertoire, Public Health & Communicable Diseases Branch is going to roll out extensive Training Programmes in the Districts. More than 900 peripheral Medical Officers who have newly joined or were missed out last time, will be covered in 23 training batches the fund for which has been totally sourced from the State Budget (PHP). A trainer pool has been formed with State level experts, faculties from Medical Colleges and Public Health officers from the State & District levels.

The Dept. of Disaster Management, West Bengal has a provision for ex-gratia of one lakh rupees payable to the next of kin in case of a snake bite

death. In the current module, practical suggestions have been incorporated about how to address the medicolegal aspect of snake bite cases and how the Medical Officer can provide the documentary support for the ex-gratia to be availed of.

The second section of the present module deals with animal bite case management and prevention of human rabies. Under the National Rabies Control Programme, West Bengal has 485 Anti-Rabies Clinics (ARC) spread across the State. Not only the secondary or tertiary care hospitals but every CD Block in the State now owns at least one ARC.

Although the categorization of exposures and the management thereof are fairly straightforward, still there are some nuances in them. Also, in certain situations, care providers are faced with a difficulty in decision making. The case management guideline issued here is not only at par with the current national recommendation, but also takes the potential confusion points into cognizance. A chapter on FAQ-s will also help clear a number of common doubts.

The last section of the module deals with different insect bites which are common occurrence in everyday medical practice, yet no management guidelines were readily available so far in the departmental communications. In that sense, this very section addresses a pending felt need of the Emergency Medical Officers. They will find here a direction on how to go about and will be able to provide the care with confidence and quality.

It is an additional pleasure for me that NTD Division of World Health Organization has come forward to join hand in this endeavour. We sincerely acknowledge the technical inputs and the support for publication extended by them.

Dr Asit Kumar Biswas
Director, Public Health
Govt. of West Bengal

Chapter 1: Snake Bite Case Management

Introduction

Snake bite is an acute life threatening and time limiting medical emergency. High-risk groups include rural agricultural workers, herders, fishermen, hunters, working children, people living in poorly constructed houses and those with limited access to education and healthcare. Children often suffer more severe effects than adults, due to their smaller body mass .Morbidity and mortality occur most frequently among young people and children suffer higher case fatality. Many of the snake bite events are not reported to health system due to poor health seeking behavior of affected people and reliance on traditional healers.

Globally estimated 5.4 million snake bite events are reported with 2.7 million envenomation as per recent WHO report. Around 81,000 to 1,38,000 people die every year due to envenomation and nearly three times people are affected by amputations and other permanent disabilities (WHO Snakebite envenoming report).

In India as per National Health Policy (2021), reported snake bite events in 2019 was 1,26,927 with 626 events of fatality. Highest burden states were-West Bengal, Andhra Pradesh, Tamilnadu , Odisha and Karnataka. These five states contribute to nearly 50% of National case load.

In 2021, number of snake bite events reported from West Bengal were 43,213 with 354 case fatalities.

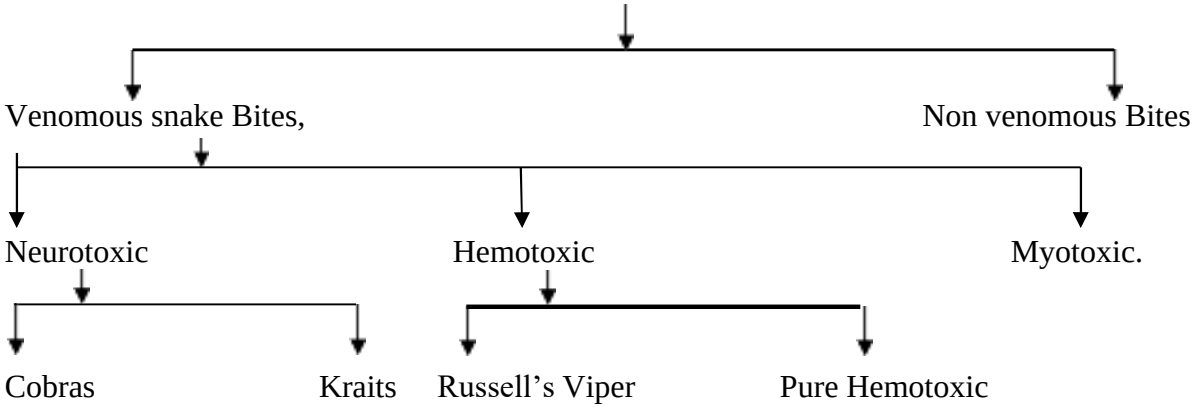
Epidemiology of Snake Bite.

Due to occurrence in mostly tropical and sub tropical countries and affecting marginalized section of community, snake bite envenomation is included as Neglected Tropical Disease by WHO. Epidemiological triad of snake bite establishes with snake as agent, human as host along with favorable environment for snake bite (rural area, agricultural field etc.). Incidence of snake bite depends on frequency of contact between snakes and human. Snakes are usually elusive ad reclusive.

Temporal pattern in frequency of snake bite incidence has been observed, more in summer and rainy season. Males are more affected by snake bite due to outdoor activities specially after sunset. Most of the snake bite victims are in age group 15-45 years.

In India four species are responsible for 99% of the venomous bites; they are called "**Big Fours**". Big fours are, 1) Spectacled Cobra (Naja naja), 2) Russell's Viper (Daboia russelli), 3) Common Krait (Bungerus caeru/eus) and 4) Saw scaled Viper (Echis carinatus).

CLASSIFICATION OF SNAKE BITES



(some neurotoxicity with vipers
Hemotoxic venom).
a) Humpnose Pit
b) Saw -scaled viper

NEUROTOXIC

Cobras:

i) Spectacle Cobra (Naja naja), local names : Gokhro , Kharish , Goma.
ii) Indian Monocled Cobra (Naja kaouthia) ; local names : Keute, Samukhbhanga.
iii) King Cobra (Ophiophagus hannah).Bengali name Sankhachur.

Kraits:

i) Common Krait (Bungarus caeruleus) ; Local names : Kalach, Kalachiti, Domnachiti, Seorchanda.
ii) Banded Krait (Bungarus fasciatus) ; Bengali name Sankhamuti.
iii) Black Krait (Bungarus niger).
iv) Wall's Sind Krait (Bungarus walli).

Gokhro | Keute | Sankha Chur | Kalach

HEMATOTOXIC

Rusell's Viper (*Daboia russelii*) ; Bengali Chandrabora.

mainly hemotoxic, with some neurotoxic venom.

Saw Scalled Viper *(Echis carinatus)*

Pure Hematotoxic (Bengali name Fursha ; very rare in W B).

Pit Vipers

i) **Humpnose Pit viper** (*Hypnale hypnale*): Pure Hemotoxic (Only in Western Ghats; Kerala and TN).

ii) **Green Pit vipers** (*Trimeresurus gramineus)*: mild venom, causes local swelling only. (Gechhobora).

iii) **Mountain Pit Viper** (*Ovophis monticola*); found in Darjeeling Hills of WB. Local name Gurbe.

Chandrabora Gechobora Sea-snake Gurbe (mountain pit**)**

MYOTOXIC: All flat tail Sea snakes.

Common Nonvenomous snakes of WB :

1) Jal Dhora , 2) Danras ,3) Ghar chiti 4) Hele, 5) Laudoga , 6) Kaalnagini, 7) Bet-acchra.

Kalnagini Danras Hele Bethacchra Laudoga

Non Snakes: (These are called as snakes ; but they are lizards)

1)Go Saap (Monitor Lizard), 2) Takshak (Chamellion).

Go saap

Takshak

However it is stated that identification of type of snake only by appearance can be misleading and is not an essential step in snake bite management. Current guidelines do not promote killing of snake and bringing it to health facility nor live captured snake to be brought.

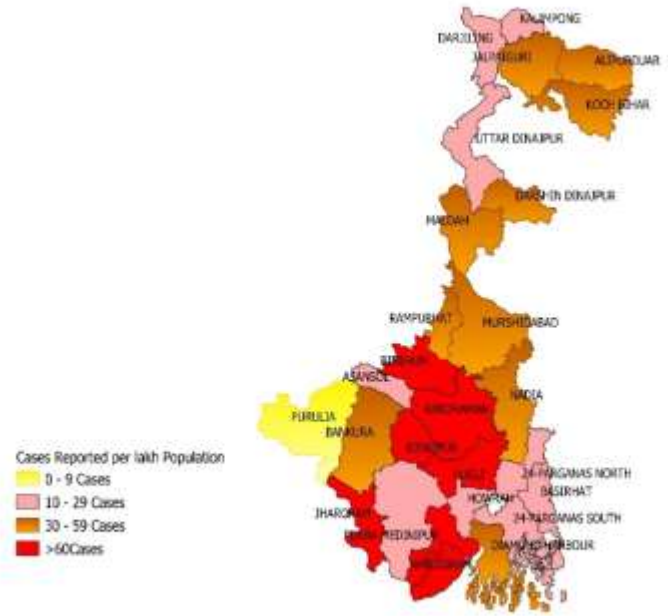
Pathophysiology of Snake Bite:

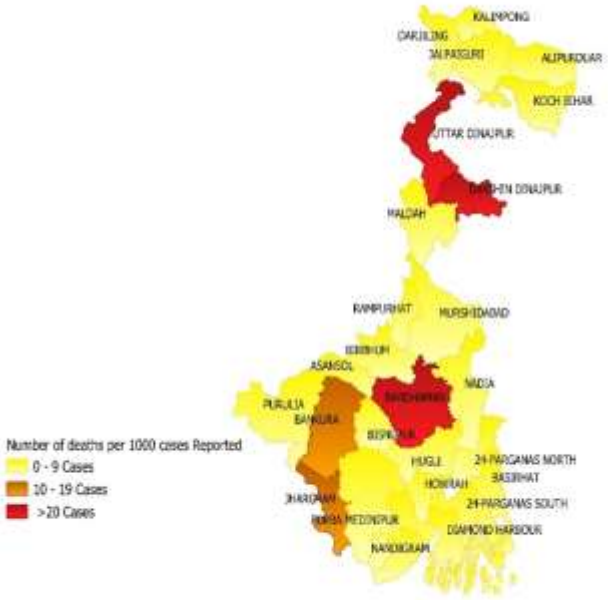
Venomous snakes have two venom glands inside their mouth, which are modified salivary glands. These two venom glands are connected with long fangs (venom teeth). These teeth may be hollow like hypodermic needles (as in R Viper) or grooved (in Cobras and kraits). When a venomous snake bites for hunting or for defense (most of the human bites), some amount of venom is injected into the bitten soft tissue. This venom is gradually absorbed from the deposit site mainly via lymphatics; in a small percentage of cases there may be direct venipuncture or intramuscular injection of the venom. Systemic effects of venom are noted after spread from the deposit site.

Fatal dose of venom varies from species to species. These are 42 mg in R Viper, 15 mg in Cobras (Gokhro and Keute), and only one milligram in Common Krait. Fatal dose of venom may not be injected in 50% of venomous snakebites due to different factors.

More than 90% (w/v) of the venom is different biologically active proteins. These proteins are different enzymes (more than hundred types), non-enzymatic polypeptide toxins, and non-toxic proteins such as nerve growth factor.

Snake Bite West Bengal-2021



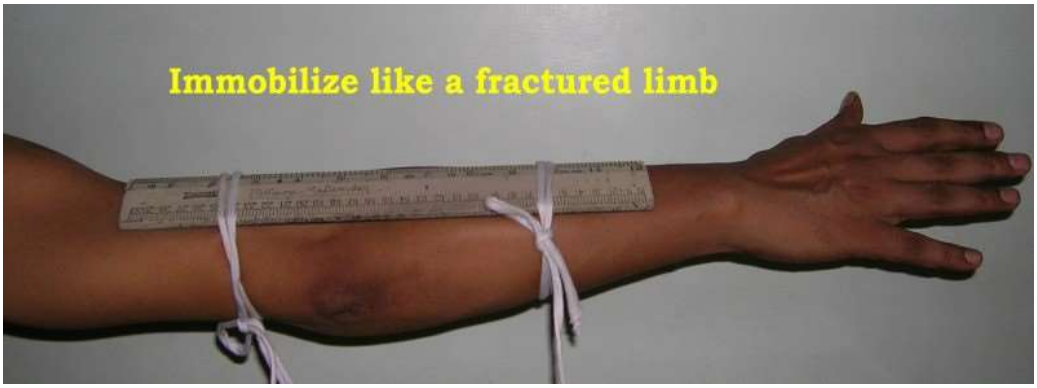


First Aid Measure

In view of the limitations, both tourniquets and 'Pressure Immobilization Method' (PIM) are rejected for use in India. PIM requires a skilled medical or paramedical person to be present at the site of accident which is rarely possible. The first aid recommended is based around the mnemonic: "Do it R.I.G.H.T." It consists of:

R. = Reassure. This is vital. Whenever and whatever snake bites a person, he/she becomes panicked. This panic may lead to a cardiac attack also. If the patient gets panicked his heart rate would increase which in turn would spread the venom rapidly. Try to reassure the patient. Tell him that seventy per cent of all snakebites are from non-venomous species. Only 50% of bites by venomous species actually envenomate the patient.

I. = Immobilize. Immobilize the bitten limb in the same way as a fractured limb. Use bandages or cloth to hold the splints, not to block the blood supply or apply pressure. Do not apply any compression in the form of tight ligatures. They do not work and can be dangerous particularly in case of Russell's viper bite. If the bite is on the trunk, carry the patient in supine position on a stretcher or country cot. Children can be carried on shoulder. If possible, the extremity should be maintained in a neutral position of comfort at approximately heart level.



G.H. = Go to Hospital immediately. This has got no other alternative. Traditional remedies have NO benefit in treating snakebite. Most of the vital time is lost at the chamber / house of traditional healers. Refer the case to a health center / hospital where AVS is available. For rapid transport in rural areas " Motor bike Ambulance" may be used.

T – Tell the doctor of any progress/new symptoms such as ptosis that manifest on the way to hospital. Attempting to capture and transport the offending snake, alive or dead, is not advised.

Gangrene due to tight tourniquet in viper bite :

Handling Tourniquets

- Never remove tourniquet in emergency room.
- Before removal of the tourniquet, test for the presence of a pulse distal to the tourniquet. Care must be taken when removing tight tourniquets. Sudden removal can lead to a massive surge of venom leading to neurological paralysis, hypotension due to vasodilation etc. Be prepared to handle the complications such as sudden respiratory distress or hypotension. If the tourniquet has occluded the distal pulse, then a blood pressure cuff can be applied to reduce the pressure slowly.
- Pro-coagulant enzymes will cause clotting in distal blood. In addition, the effect of the venom causing vasodilation presents the danger of massive hypotension when the tourniquet is released.
- **Venom sequestration devices (e.g., lympho-occlusive bandages or**

tourniquets) are not advised, as they may intensify local tissue damage by restricting the spread of potentially necrotizing venom. Tourniquet use can result in loss of function, ischemia, and limb amputation, even in the absence of envenomation.

Bite Mark

A bite from a venomous snake may show one or more punctures, a small abrasion and perhaps a linear laceration. **Bite marks to determine whether the biting species was venomous or non venomous are of no use**. The pattern of fang marks is of no help in ascertaining the amount of venom injected, severity of systemic poisoning and nature of poisoning – Elapidae or Viperidae venom. Very fine bite marks of Common Krait snakes are almost invisible (particularly in dark complexions). So, searching for bite marks in a case of CK bite is almost always misleading.

Painful Progressive Swelling (PPS)

Progressive painful swelling is indicative of local venom toxicity. This is associated with:

- Local necrosis which often has a rancid smell. Limb is swollen and the skin is taut and shiny. Blistering with reddish black fluid at and around the bite site. Skip lesions around main lesion are also seen.
- Ecchymoses due to venom action destroying blood vessel wall.
- Significant painful swelling potentially involving the whole limb and extending onto the trunk.
- Compartment syndrome may be present
- Regional tender enlarged lymphadenopathy.

Any jewelry or tight-fitting clothing near the bite should be removed to avoid constriction from anticipated soft-tissue swelling.

Clinical features of a compartmental syndrome (mostly in Russel's viper bite)

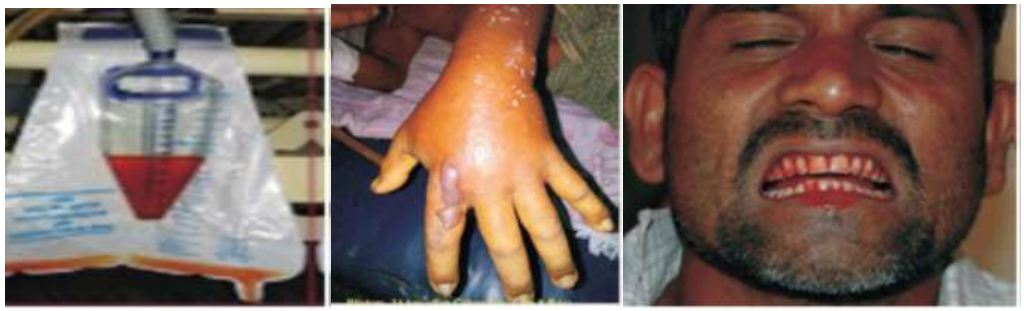
Compartment syndrome is diagnosed with 5 'P' –

- ❖ Pain (severe) on passive movement
- ❖ Pallor
- ❖ Paresthesia
- ❖ Pulselessness
- ❖ Paralysis or weakness of compartment muscle.

General signs and symptoms of **Viper envenomation (Hemotoxic):**

- Swelling and local pain.
- Pain at bite site and severe swelling leading to compartment syndrome. Pain on passive movement. Absence of peripheral pulses and hypoesthesia over the sensory nerve passing through the compartment helps to diagnose compartment syndrome.
- Tender enlargement of local lymph nodes (as large molecular weight Viper venom enter the system via the lymphatics).
- Continuous bleeding from the bite site
- Bleeding from the gum and other orifices.
- Epistaxis
- Vomiting (may be blood stained or not), hematemesis, hemoptysis, bleeding per rectum,
- Acute abdominal pain (which may suggest gastro-intestinal or retro peritoneal bleeding).
- Hypotension (resulting from hypovolemia or direct vasodilation).
- Low back pain, indicative of an early renal failure or retroperitoneal bleeding, (although this must be carefully investigated as many rural workers involved in picking activities complaint of back pain generally).
- The skin and mucous membranes may show evidence of petechiae, purpura, and ecchymosis.

- The passing of reddish or dark-brown urine or declining or no urine output.
- Lateralizing neurological symptoms and asymmetrical pupils may be indicative of intra- cranial bleeding.
- Parotid swelling, conjunctival oedema, sub-conjunctival hemorrhage.

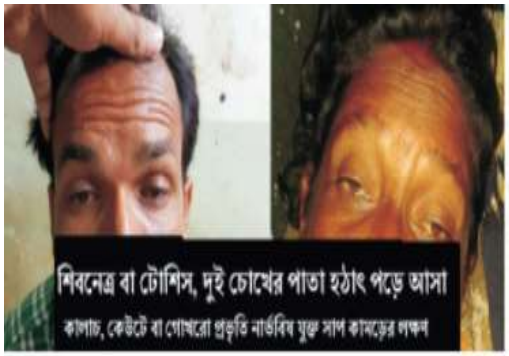


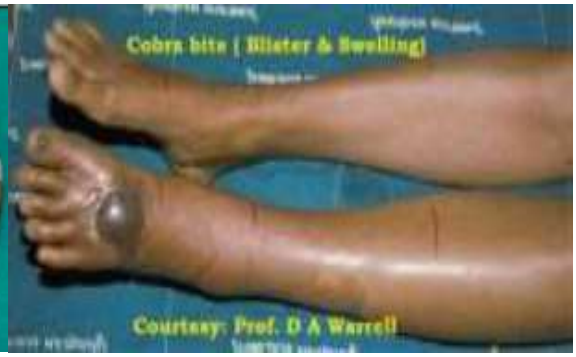
Life threatening complications

1. Acute Kidney Injury (AKI) e.g. declining or no urine output, deteriorating renal signs such as rising serum creatinine, urea or potassium. Some species e.g. Russell's viper (*Daboia* sp) frequently cause acute Kidney Injury. Patient presents with bilateral renal angle tenderness, albuminuria, hematuria, hemoglobinuria, myoglobinuria followed by oliguria and anuria with AKI.
2. Hypotension due to hypovolemia or direct vasodilatation or direct cardiotoxicity aggravates acute kidney injury.
3. Parotid swelling, conjunctiva oedema, sub-conjunctival hemorrhage, acute respiratory distress syndrome [leaking syndrome] and refractory shock.
4. Long term sequelae e.g. pituitary insufficiency with Russell's viper (*Daboia* sp), Sheehan's syndrome or amenorrhea in females.

General signs and symptoms of Neurotoxic envenomation:

- Descending paralysis, initially of muscles innervated by the cranial nerves, commencing with ptosis, diplopia, or ophthalmoplegia. The patient complains of difficulty in focusing and the eyelids feel heavy.
- Progressive swelling and local pain (Cobra).
- Local necrosis and / or blistering (Cobra).
- Paralysis of jaw and tongue may lead to upper airway obstruction and aspiration of pooled secretions because of the patient's inability to swallow (pharyngeal palsy).
- Numbness around the lips and mouth, progressing to pooling of secretions, bulbar paralysis and respiratory failure.
- Hypoxia due to inadequate ventilation can cause cyanosis, altered sensorium and coma. This is a life threatening situation and needs urgent intervention.
- Paradoxical respiration, as a result of the intercostals muscles becoming paralyzed is a frequent sign.
- Stomach pain suggesting submucosal hemorrhage in the stomach (Krait).
- Krait bites often present in the early morning with paralysis that can be mistaken for a stroke.





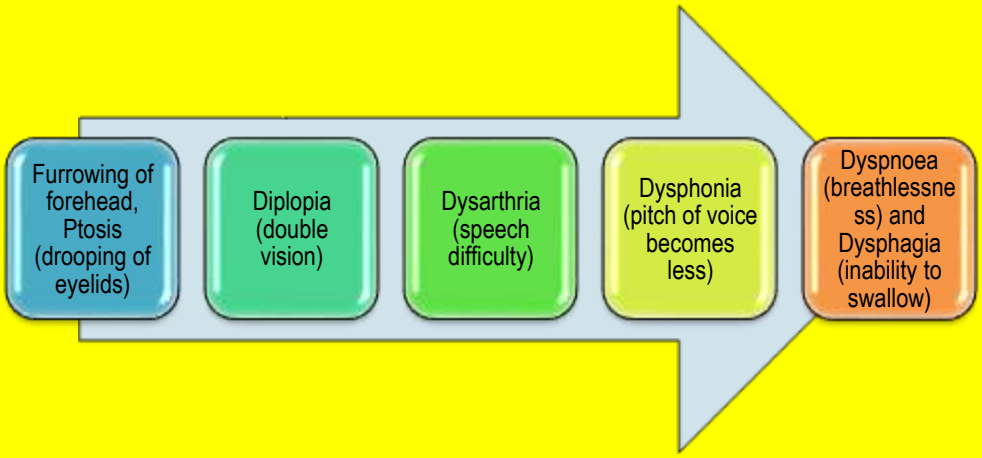
Neuroparalytic snakebite patients present with typical symptoms within 30 min– 6 hours in case of Cobra bite and 3 – 24 hours for Krait bite; however, ptosis in Krait bite have been recorded as late as 36 hours after hospitalization.

These symptoms can be remembered as 5 Ds and 2 Ps.

- **5 Ds – dyspnea, dysphonia, dysarthria, diplopia, dysphagia**
- **2 Ps – ptosis, paralysis**

In chronological order of appearance of symptoms

Furrowing of forehead, Ptosis (drooping of eyelids) occurs first, followed by Diplopia (double vision), then Dysarthria (speech difficulty), then Dysphonia (pitch of voice becomes less) followed by Dyspnoea (breathlessness) and Dysphagia (inability to swallow) occurs.



All these symptoms are related to 3rd, 4th, 6th and lower cranial nerve paralysis.

Finally, paralysis of intercostal and skeletal muscles occurs in descending manner.

Other signs of impending respiratory failure are diminished or absent deep tendon reflexes and head lag. Additional features like stridor, ataxia may also be seen. Associated hypertension and tachycardia may be present due to hypoxia.

Bilateral dilated, poorly or a non-reacting pupil is not the sign of brain death in elapid envenoming.

To identify impending respiratory failure bedside lung function test in adults viz.

i. Single breath count – number of digits counted in one exhalation - normal >30

ii. Breath holding time – breath held in inspiration – normal > 45 sec

iii. Ability to complete one sentence in one breath.

Late-onset envenoming

The patient should be kept under close observation for at least 24 hours. Many species, particularly the Krait and the Hump-nosed pit viper (not present in WB, only present in Western Ghat), are known for the length of time it can take for symptoms to manifest. Often this can take between 6 to 12 hours. Late onset envenoming is a well-documented occurrence. [N.B. Bilateral ptosis was noted after 42 hours of admission with sore throat in a krait bite patient, admitted in the ENT dept. of Aliporeduar SD Hospital in 2013]

Krait bite victims

Krait bites are often absolutely painless. Krait bite victims often present in the early morning with paralysis without any local signs or bite marks.

Early morning symptoms of acute pain abdomen with or without neuroparalysis can be mistaken for a acute appendicitis, acute abdomen, stroke, GB syndrome, myasthenia gravis and hysteria (Bawaskar 2002).
Krait bite envenoming is diagnosed by observing **descending neuroparalysis** while GB syndrome is by ascending paralysis.

Snakebite victim often gets up in the morning with severe epigastric/umbilical pain with vomiting persisting for 3 – 4 hours and followed by typical neuroparalytic symptoms within next 4- 6 hours. There is no history of snakebite.

Unexplained respiratory distress in children in the presence of ptosis or sudden onset of acute flaccid paralysis in a child (**locked-in syndrome**) is highly suspicious symptoms in endemic areas particularly of Krait bite envenomation. Sometimes patients may present with **throat, chest or joint pain**.

Locked in syndrome (LIS)

Locked in syndrome (LIS) is defined as quadriplegia and anarthria with preserved consciousness. Patients retain vertical eye movement, facilitating non-verbal communication. In complete locked in syndrome (LIS) patient cannot communicate in any form. Central LIS is seen commonly due to lesions in the ventral pons (Smith and Delargy 2005; Prakash 2008; Poovazhagi 2013).

Peripheral causes of LIS are severe acute polyneuropathies, neuromuscular junction blockade due to myasthenia gravis toxins and snakebite (Prakash 2008). **Knowing the peripheral causes are very important as one may make a wrong diagnosis of brain death** and is treatable and complete recovery can be possible with timely intervention. Confirmatory tests like EEG, cerebral blood flow, nerve conduction velocities are recommended to avoid misdiagnosis of coma or brain death.

Peripheral LIS usually occurs in **Elapidae bites, especially Krait bite** and hence increasing one's suspicion rate is important as they can be referred to a center with ventilator support.

Diagnosis and testing

- Carry out a **simple medical assessment** including history and simple physical examination – local swelling, painful tender and enlarged local lymph glands, persistent bleeding from the bite wound, bleeding (gums, nose, vomit, stool or urine), level of consciousness, drooping eyelids (ptosis) and other signs of paralysis.
- **Monitor the patient closely** and repeat all above, every 1-2 hourly.
- Check for and monitor the following: **Pulse rate, respiratory rate, blood pressure and 20 minutes Whole Blood clotting test (20 WBCT)** every hour for first 3 hours and every 4 hours for remaining 24 hours.
- Check distal pulses and monitor if there is presence of gross swelling. The presence of a pulse does not rule out compartment syndrome. Pain on passive movement, pallor, pulseless limb, hypoesthesia over the sensory nerve passing through the compartment is **suggestive of compartment syndrome.**
- Severe local symptoms are defined as swelling rapidly crossing a joint or involving half

the bitten limb, in the absence of a tourniquet. Once the tourniquet has been removed for more than one hour, if the swelling rapidly continues, this should be viewed as venom generated and not due to the continuing effect of the tourniquet. ***Progressive local swelling is the commonest sign of envenomation***. There would be local pain along with swelling [Particularly in case of Russell's Viper and Cobra bites].

- **Neurological signs and symptoms** are Ptosis, hoarseness of voice (due to pharyngeal and palatal palsy), then progressing to respiratory failure (in both Cobras and Kraits).
- In case of viper bites [hematotoxic like Russell's Viper or 'Chandrabora'] in addition to local pain and swelling there would be signs of coagulopathy. If you suspect coagulopathy, do not wait for red coloration of urine, but do the **20 Minute Whole Blood Clotting Test (20 WBCT)** which is adopted as the standard test.

20 Minute Whole Blood Clotting Test (20 WBCT)

20 WBCT is simple to carry out but crucially requires a clean and dry glass test tube or glass vial (Must be glass not Plastic. If the vessel used for the test is not made of ordinary glass, or if it has been cleaned with detergent, its wall may not stimulate clotting of the blood sample (surface activation of factor XI – Hageman factor) and test will be invalid.

Draw **2-3 ml of venous blood**. **Keep this fresh blood in a dry test tube left undisturbed at ambient temperature for 20 minutes [cf. normal clotting time is 8 min maximum] and then gently tilt the tube.**

If the blood is still liquid (not clotted) this is evidence of coagulopathy and confirms that the biting species is a Viper. Cobras or Kraits do not cause anti-hemostatic symptoms.

If cobra bite is not surely proved and first blood test is "clotted" the test should be carried out **every hourly for four times**; after that, if incoagulable blood is discovered, the **6 hourly cycles is then be adopted to test for the requirement for repeat doses of AVS.**

In coagulopathy, there may be continuous oozing from bite site, gum or old ulcers. Then lead to hemoptysis and hematuria and ultimately renal failure. (In Chandrabora bite there would be Ptosis also).

20 Minutes Whole Blood Clotting Test (20WBCT)

Signs of envenomation	**20 Minutes Whole Blood Clotting Test (20WBCT)**			**Action to do**
	Observation	Interpretation	Reason	
No immediate sign of envenomation	Blood CLOTTED	No coagulopathy	May be Normal	Repeat hourly for 4 times and then 6 hourly for next 24 hours
No immediate sign of envenomation, or features of haemo-toxic envenomation present	Blood Not CLOTTED	Coagulopathy	Viper bite	Scenario 1: Give 10 vials of AVS. After 1 hour, no active bleeding*, then no further AVS and repeat WBCT after 6 hour
				Scenario 2: Give 10 vials of AVS. After 1-hour, active bleeding* continues, then additional 10 dose of AVS given immediately without waiting for WBCT result for 6 hours. (maximum 30 vials required). Repeat WBCT after 6 hours of stopping active bleeding.
Signs of neurotoxic envenomation	Blood CLOTTED	No coagulopathy	Cobra / Krait bite	Give 10 dose of AVS. Repeat 10 dose after 1 hour if no signs of improvement are observed. Along with start Atropine and Neostigmine. Confirmed neurotoxic envenomation case requires no repeat 20WBCT for giving AVS

* Active bleeding can be bleeding from any of the natural orifices, gum bleeding or oozing of blood from the site of bite, old wound or venipuncture site, etc. Haematuria if present, AVS to be given. Haematuria should also be taken as a feature of bleeding; but sometimes hematuria appears late, hence urine must be followed up.

Management of Snakebite:

The following general principles are to be followed:

- Admit all cases with history of bites (Snake or unknown). All patients will be kept under observation for a minimum of 24 hours.
- Initial hospital management should focus on the victim's airway, breathing, and circulation. Patients with bites to the face or neck may require early endotracheal intubation to prevent loss of airway patency caused by rapid soft-tissue swelling.
- Vital signs, cardiac rhythm, oxygen saturation, and urine output should be closely monitored. Two large-bore IV lines should be established in unaffected extremities. Because of the potential for coagulopathy, venipuncture attempts should be minimized and noncompressible sites (e.g., a subclavian vein) avoided.
- Closely observe for any sign of local or Systemic envenomation. In 50% of known venomous snake bite there may not be any envenomation (called dry bite).
- Monitor the patient closely and repeat all above, every 1-2 hourly.

Important don'ts

1. Do not attempt to kill or catch the snake as this is dangerous and not essential.
2. Do not interfere with the bite wound (incisions, suction, rubbing, tattooing, vigorous cleaning, massage, application of herbs or chemicals, cryotherapy, cautery) as this may introduce infection, increase the flow of venom into system by stimulating lymphatic system, increase absorption of the venom and increase local bleeding.
3. Do NOT apply or inject Anti snake venom serum (AVS) locally.
4. Do not tie tourniquets as it may increase risk of ischemia and gangrenous limbs; increase risk of embolism if used in viper bite.
5. Cutting the biting site in a victim with incoagulable blood increases the risk of severe bleeding as the clotting mechanism is no longer effective and increases the risk of infection. No venom is removed by this.
6. Electrotherapy and cryotherapy should be avoided.

Criteria for Administration of AVS

- AVS should be used with evidence of systemic envenomation or severe progressive local swelling.
- Evidence of coagulopathy- detected by 20WBCT or visible spontaneous abnormal from gums, bite sites, injection sites, etc.
- Evidence of neurotoxicity- ptosis, external ophthalmoplegia, muscle paralysis, inability to lift the head, etc.

Doses and administration

Neurotoxic/ Hemotoxic: 10 vials.

The **initial dose is 10 vials for both adults and children** as AVS is targeted at neutralizing the venom. Snakes inject the same amount of venom into adults and children.

Premedication before starting AVS:

First of all keep in hand one ampoule of Inj. Adrenaline. ***Give 0.25 ML Inj. Adrenaline Subcutaneously as premedication*** and keep 0.5 ML aside ready.

All AVS to be administered over 1 hour at constant speed. Add 10 vials of Indian Polyvalent Anti Snake Venom Serum (AVS) to the running bottle (200 ML in children) on earliest sign of envenomation. Open the fluid in jet and try to infuse 10 vials AVS in 1st hour. Closely observe for any adverse reaction to AVS, if any, treat accordingly. Pregnant women are treated in exactly the same way as other victims.

Points to note:

- AVS should be administered over one hour. There is no benefit in administering each dose over longer periods.
- To prevent volume overload undiluted AVS may be administered in oliguric or anuric patients.
- AVS must **NEVER** be given by the IM route because of poor bioavailability by this route. Also do NOT inject the AVS locally at the bite site since it is not effective, is extremely

painful and may increase intra-compartmental pressure. Take all aseptic precautions before starting AVS to prevent any pyrogenic reaction.

Signs of recovery

If an adequate dose of AVS has been administered, the following responses may be seen:

- Spontaneous systemic bleeding such as gum bleeding usually stops within 15 – 30 minutes.
- Blood coagulability is usually restored in 6 hours. (Principal test is 20WBCT).
- Post synaptic neurotoxic envenoming such as the Cobra may begin to improve as early as 30 minutes after AVS, but can take several hours.
- Presynaptic neurotoxic envenoming of Krait bite usually takes a considerable time to improve.
- In patient with shock, blood pressure may increase after 30 minutes.

Repeat doses of AVS

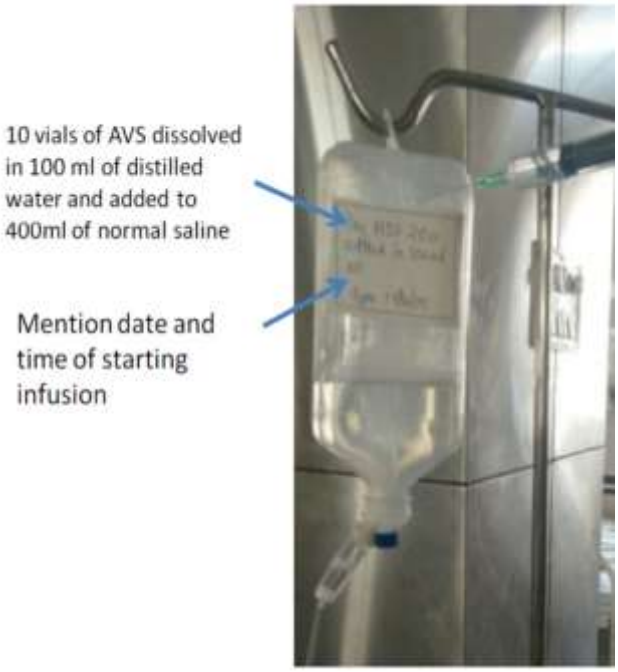
In Viper bites, once the initial 10 dose has been administered over one hour, no further AVS is given for 6 hours. If there is no active abnormal bleeding, 20WBCT test every 6 hours, will determine if additional AVS if required. This reflects the period the liver requires restoring clotting factors.

However, if clotting defect is present, there will be active abnormal bleeding after one hour of 1st dose. Then repeat 2nd dose of 10 vials immediately and should not wait for 6 hour.

In viper bites maximum 30 vials of AVS may be needed.

Monitoring:

- **Pulse rate, respiratory rate, blood pressure every hour.**
- **Blood urea, creatinine, and WBC count; potassium level if facility available (in Viper bite).**
- **Urine output, urine for RBCs (in Viper bite).**
- **Vomiting, diarrhea, abnormal bleeding.**
- **Extent of local swelling and necrosis.**
- **20WBCT at Referral Hospital (after 6 hours of 2nd dose of 10 vials).**



If there is any signs of envenoming, all including children must get 10 vials of AVS. Each vial of AVS be dissolved in 10 ml of distilled water and added to an infusion medium such as normal saline (i.e. 10 vials of AVS dissolved in 100 ml of distilled water and added to 400ml of normal saline; running fluid amount to be reduced in children).

Justification: The range of venom injected is 5 mg-147 mg. The total required dose range is between 10 and 30 vials as each vial neutralizes 6 mg of Russell's Viper venom. So after 10 vials, depending on the patient condition, additional vials can be considered.

The volume of infusion is reduced according to the body size and the state of hydration of the patient. In oliguric patients restrict fluids and use infusion pump to give full dose of AVS over 30 minutes.

Pregnant women are treated in exactly the same way as other victims. The same dosage of AVS is given. Refer the victim to a gynecologist for assessment of any impact on the foetus.

Children also are given exactly the same dose of AVS as adults as snakes inject the same amount of venom into children and adult. Liquid or reconstituted AVS is diluted in 5-10 ml/kg body weight of normal saline.

AVS dosage in victims requiring lifesaving surgery: Rarely patient may develop intracranial bleeding for which a lifesaving surgery is required. In such cases before surgery coagulation must be restored to avoid catastrophic bleeding and higher initial dose of AVS (up to 30 vials) can be administered.

AVS (Skin Test), is it recommended ?: No. AVS test dose has been abandoned. They have no predictive value in anaphylactoid or late serum reaction. This test is mostly false negative.

Management of Adverse reactions to AVS

Adverse reactions, either anaphylactoid or pyrogenic, have often been identified as reasons not to administer AVS in smaller local hospitals. The fear of these potentially life-threatening reactions has caused reluctance amongst some doctors to treat snakebite. However, if handled early and with primary drug of choice, these reactions are easily surmountable and should not restrict doctors from treating snakebite. Early intervention against these kinds of reactions has been shown to have more positive outcomes. Patients should be monitored closely as there is evidence that many anaphylactoid reactions go unnoticed.

Common signs of adverse reactions to AVS singly or in any combination are: Urticaria, Itching (particularly Scalp itching), Fever, Shaking chills, Vomiting, Diarrhea, Abdominal cramps, Tachycardia, Hypotension, Bronchospasm and Angio-oedema. Any new sign or symptoms or unexplained uneasiness after ASV infusion should be taken as indication of reaction.

Premedication: With 0.25 ML Inj. Adrenaline S/C, most of the AVS reactions can be prevented.

At the first sign of any of the above-mentioned signs,

i. Stop AVS drip temporarily for the time being and

ii. **Give 0.5 ml (0.5 mg of 1:1000) Adrenaline IM over deltoid or thigh**. The pediatric dose is 0.01 mg / kg body weight of Adrenaline IM.

iii. If after 10 to 15 minutes the patient's condition has not improved or is worsening, a second dose of 0.5 mg of Adrenaline 1:1000 IM is given.

iv. Oxygen

v. Start fresh IV normal saline infusion with a new IV set

vi. 100 mg of hydrocortisone and an H1 antihistamine, (Phenimarine maleate 22.5 mg IV or Promethazine HCl 25 mg IM, or 10 mg chlorphenimarine maleate IV.)

vii. The dose for children is of Phenimarine malate at 0.5 mg/kg/day IV or Promethazine HCl can be used at 0.3 – 0.5 mg/kg IM or 0.2 mg/kg of chlorphenimarine maleate IV and 2 mg/kg of hydrocortisone IV. Antihistamine use in pediatric cases must be deployed with caution.

viii. Once the patient has recovered, re-start ASV slowly for 10-15 minutes keeping the patient under close observation. Then resume normal drip rate.

Addition Management for Neurotoxicity

Neostigmine is an anticholinesterase that prolongs the life of acetylcholine and can therefore reverse respiratory failure and neurotoxic symptoms. It is particularly effective for post-synaptic neurotoxins such as those of the Cobra. There is some doubt over its usefulness against the pre- synaptic neurotoxin such as those of the Krait and the Russell Viper.

In the case of neurotoxic bites, once the first dose of AVS has been administered, and a Neostigmine test given, the victim is closely monitored.

Atropine Neostigmine (AN) dosage schedule: Patients with clear, objective evidence of neurotoxicity (e.g., ptosis or inability to maintain upward gaze) should receive neostigmine along with AVS
Step 1: Loading dose a. Pre-treat with atropine: 0.6 mg IV (children, 0.02 mg/kg with a minimum of 0.1 mg) b. Treat with: Neostigmine (1.5 mg) IV or IM (children, 0.04 mg/kg)
Step 2: Maintenance dose If objective improvement is evident after 30 min, treat with: a. Neostigmine: 0.5 mg IV, IM, or SC (children, 0.01 mg/kg) every 30 minutes for 5 doses b. Atropine: 0.6 mg as IV continuous infusion (One ampoule Atropine in 1 bottle NS) over 8 h (children, 0.02 mg/kg over 8 h)
Thereafter to be given as tapering dose at 1 hour, 2 hour, 6 hours and 12 hour. Majority of patients improve within first 5 doses. Observe the patient closely for 1 hour to determine if the neostigmine is effective. After 30 minutes, any effect should be visible by an improvement in ptosis. Positive response to “AN” trial is measured as 50% or more recovery of the ptosis in one hour.

Stop Atropine neostigmine (AN) dosage schedule if:

- Patient has complete recovery from neuro paralysis. Rarely patient can have recurrence, carefully watch patients for recurrence.
- Patient shows side effects in the form of fasciculations or bradycardia (these are signs of neostigmine overdose; give 0.3 mg atropine IV stat).
- If there is no improvement after 3 doses.

Improvement by Atropine - Neostigmine indicates Cobra bite. **Give one dose of "AN" injection before transferring to the higher center.**

If after 30 minutes the victim has not improved or has worsened, then a second and final dose (of Both Atropine and Neostigmine) should be given. If no improvement even after 2nd dose of Atropine and Neostigmine, the patient will require mechanical ventilation. **Repeat 2nd dose of 10 vials of AVS if neurodeficit remains even after 2nd injection of Atropine and Neostigmine.**

If there is no improvement after repeat doses of Atropine Neostigmine (after 1 h), this indicates probable Krait bite. Krait affects pre-synaptic fibers where calcium ion acts as neurotransmitter. **Give Inj. Calcium gluconate 10ml IV (in children 1-2 ml/kg (1:1 dilution) slowly over 5-10 min every 6 hourly for next 24 hours.** Usually neuroparalysis recovers within 5-7 days

Whenever there is non-response of neurotoxic features, the patient should be advised for mechanical ventilation support.

REFERRAL CRITERIA: **Neurotoxic Envenomation**

- Progressive neuroparalysis - transfer with life support in ambulance for mechanical ventilation.

Whilst it is entirely possible to maintain a neurotoxic victim by simply using a resuscitation bag, this should always be used as a last resort; the ideal means of support remains a mechanical ventilator (*Battery operated Transport Ventilator)* operated by qualified staff.

- PHC and even many referral hospitals are not equipped with mechanical ventilators. The most important factor, therefore, is when to refer a patient to a hospital with a ventilator.

o The key criteria to determine whether respiratory failure, requiring mechanical ventilation is likely, is the 'neck lift' to elicit broken neck sign.

o Neurotoxic patients should be frequently checked on their ability to perform a neck lift. If they are able to carry out the action then treatment should continue until recovery in the BPHC.

o Neck lift test is also useful for children except very young children who may not be able to follow commands.

o Other tests which indicate descending paralysis are declining single breath count, pooling of saliva.

o If the patient reaches the stage when patient cannot do neck lift, immediately refer the patient to a hospital with a mechanical ventilator.

- Maintain oxygen saturation using Pulse oximetry. Oxygen saturation <90% patient indicates requirement for ventilator support.

Remember- Antivenom treatment alone cannot be relied upon to save the life of a patient with bulbar and respiratory paralysis. Death may result from aspiration, airway obstruction or respiratory failure.

Additional Management for Hemotoxicity

If there is definite history of viper bites or signs abnormal bleeding or 20WBCT test comes ‘not clotted’ indicating coagulopathy, refer the case to a Hospital having facility of kidney function test/ dialysis after giving initial dose of 10 vials of AVS.

Repeat another 10 vials of AVS in fluid in jet if active bleeding persists (this should be done before referral).

Renal failure, a common complication is contributed by intravascular hemolysis, DIC, direct nephrotoxicity, hypotension and rhabdomyolysis.

Renal damage can develop very early in Russell viper bite and even when patient arrives at hospital soon after bite. Even when ASV is administered within 1-2 hours after bite, it was incapable of preventing ARF.

The following are indications of renal failure:

 Declining or no urine output although not all cases of renal failure exhibits oliguria.

 Blood testing

- o Serum creatinine > 5gm/dl or rise of >1 mg/day
- o Urea >200 mg/dl
- o Potassium > 5.6 mmol/l (Confirm hyperkalemia with EKG)
- o Evidence of uremia or metabolic acidosis

Management of renal failure:

 Early intervention with early initiation of ASV

 Control of hypotension

 Control of coagulopathy

 Hemodialysis

 Control of hyperkalemia

Declining renal parameters require referral to specialist nephrologist with access to dialysis facility.

REFERRAL CRITERIA: **Vasculotoxic envenomation**

- If no ASV is available, transfer to a hospital (where ASV availability is confirmed over the phone).
- If 20 WBCT is "not clotted" after loading dose of 10 vials of ASV as in case of Viper bite.
- If patient is continuing to bleed even after full dose of ASV, transfer to a tertiary care medical college or higher level of health facility.
- Signs of kidney injury or abnormal kidney function test. Transfer to a tertiary care center or higher level of health facility having dialysis facility.
- Compartment syndrome
- Progressive septicaemia

Forced Alkaline Diuresis (in referral hospital)

If the patient has oliguria or dipstick positive for blood give a trial of forced alkaline diuresis (FAD) within first 24 hours of the bite to avoid pigment nephropathy leading to acute tubular necrosis (ATN).

Delayed FAD has no role.

Sequence of FAD in adults is as follows:

- Inj. Frusemide 40 mg IV stat
- Inj. Normal saline 500 ml + 20 ml of $NaHCO_3$ over 20 minutes
- Inj. Ringer's lactate 500 ml + 20 ml of $NaHCO_3$ over 20 minutes
- Inj. 5% dextrose 500 ml + 10 ml of Potassium Chloride over 90 minutes
- Inj. Mannitol 150 ml over 20 min

Whole cycle completes in 2 h 30 min and urine output of 3 ml/min is expected.

If patient responds to first cycle, continue for 3 cycles. FAD converts oliguria into polyuria and avoid ATN and acute kidney injury needing dialysis in more than 75% patients. If there is no response to furosemide discontinue FAD and refer patient immediately to a higher center for dialysis.

Indications for dialysis are:

- Absolute value of Blood urea >130 mg/dl (27 mmol/L) (BUN 100 mg/dl),

Sr. Creatinine > 4 mg/ dl (500 □mol/L) OR evidence of hypercatabolism in the form of daily rise in blood urea 30 mg/dL

(BUN > 15), Sr. Creatinine > 1 mg/dL, Sr. Potassium > 1 mEq/L and fall in bicarbonate >2 mmol/L

□ Fluid overload leading to pulmonary oedema

□ Hyperkalemia (>7 mmol/l (or hyperkalemic ECG changes)

□ Unresponsive to conservative management

□ Uremic complications – encephalopathy, pericarditis.

General Management

Antibiotic Management

- There are many factors that contribute to potential infection in snakebite, including poor or over aggressive first aid, oral flora of the snake and environmental factors. Routine use of antibiotic is not necessary, although it should be considered if there is evidence of cellulites or necrosis.

  Where wound infection is suspected give prophylactic broad-spectrum antimicrobial treatment for cellulitis after completion of first 10 vials of AVS) with following: **Amoxicillin-clavulanic and Metronidazole**

1. Inj. Amoxicillin+ clavulanic acid 1.2 g IV thrice daily for first 7 days then switch to oral therapy Tab. Amoxicillin+ clavulanic acid 625 mg three times a day for further 3-7 days; In children, the dose is 100 mg/Kg/day in three divided doses intravenously; for oral therapy, the dose is 50 mg/kg/day in three divided doses.

   Alternatively Inj Ceftriaxone 1 g IV twice daily (in children the dose is 100 mg/kg/day in two divided doses) for 7 days. Both Amoxicillin+ clavulanic acid and Ceftriaxone are mainly excreted through Kidney. Therefore, in case of acute kidney injury in Viper bites dose of both these antibiotics should be reduced and adjusted according to renal function. Nephrotoxic antibiotics may be avoided (i.e. avoid aminoglycosides such as gentamicin).

2. Inj. Metronidazole 400 mg IV infusion thrice daily for 7 days; in children- 30 mg/kg/day in 3-4 divided doses.

Management of Hypotension

If the patient has intravascular volume depletion, indicated by supine or postural hypotension, or empty neck veins, proceed as follows:

1. Establish intravenous access.
2. Give fluid challenge: In adult patient 200 ml normal saline in 5 minutes first, check BP response, if positive additional fluid given over 30 min or until the jugular venous pressure/central venous pressure has risen to 8-10 cm above the sterna angle (with the patient propped up at 45^{o}).
3. Observe the patient closely while this is being done. The fluid challenge must be stopped immediately if pulmonary oedema develops.

Management of Pain

Snakebite can often cause severe pain at the bite site. This can be treated with analgesics such as paracetamol only.

Aspirin should not be used due to its adverse impact on coagulation. Do not use non steroidal anti inflammatory drugs (NSAIDs) as they can cause bleeding. This can be particularly dangerous in a patient already having coagulopathy.

Mild opiates such as Tramadol, 50 mg can be used orally for relief of severe pain. In cases of severe pain at a tertiary center, Tramadol can be given IV.

Coagulopathy Management

In case of prolonged CT, PT, aPTT administer fresh frozen plasma (FFP) infusion. Associated low platelets indicates consumption coagulopathy and disseminated intravascular coagulopathy (DIC).

 To confirm fibrinogen level, FDP should be estimated. Low fibrinogen and high FDP will require fibrinogen/FFP supplementation.

 Bleeding leads to anemia, PCV of 30% must be maintained. Therefore, measure serial PCV every 4 – 6 h depending upon severity of bleeding. If PCV is lower than 30, patient needs blood transfusion/Packed cell transfusion.

 Avoid intramuscular injections.

 FFP administration after ASV administration results in more rapid restoration of clotting function in most patients, but no decrease in discharge time. Early FFP administration (< 6-8 h) post-bite is less likely to be effective. Administer 10-15 ml/kg of FFP within over 30–60 min within 4 hours of ASV administration.

 Non –response to FFP can occur with use of FFP that has low activity of F V and F VIII, because of either poor storage or excess time of thawing prior to administration.

Heparin is ineffective against venom-induced thrombosis and may cause bleeding on its own account. It should never be used in cases of snakebite.

Antifibrinolytic agents are not effective and should not be used in victims of snakebite.

Management of Swelling

Persistent moderate swelling of the limb after viper bite can be successfully managed by repeated Magnesium Sulphate Compresses (in the layers of wet bandage, changed 2 to 3 times a day for 5 to 7 days).

Debridement of necrotic tissue

Wait for 5-7 days before commencing debridement of necrotic tissue in order to specify the line of demarcation between viable and non-viable tissue. Refer patients requiring skin grafting and amputation of a necrotic digit/limb to a Surgeon after completion of ASV treatment.

Treatment of Late (serum sickness–type) reactions

i. Inj. Chlorpheniramine 2 mg in adults (In children 0.25 mg/kg/day) 6 hourly for 5 days.
ii. In patients who fail to respond within 24–48 h give a 5-day course of Prednisolone (5 mg 6 hourly in adults and 0.7 mg/kg/day in divided doses in children).

Management for compartment syndrome:

Check distal pulses and monitor if there is presence of gross swelling. The presence of a pulse does not rule out compartment syndrome. Pain on passive movement, pallor, pulseless limb, hypo aesthesia over the sensory nerve passing through the compartment are suggestive of

compartment syndrome. Since compartment syndrome is rare in snakebite victims and fasciotomy done without correction of hemostatic abnormality may cause the patient to bleed to death. Take surgical opinion along with initial medical management.

Discharge:

If no symptoms and signs develop after 24 hours, the patient can be discharged.

Keep the patient under observation for at least 48 hours if ASV was infused.

Follow-up:

A snakebite victim discharged from the hospital should continue to be followed up.

At the time of discharge patient should be advised to return to the emergency, if there is worsening of symptoms or signs such as evidence of bleeding, worsening of pain and swelling at the site of bite, difficulty in breathing, altered sensorium, reduced or increased urine output etc. The patients should also be explained about the signs and symptoms of serum sickness (fever, joint pain, joint swelling) which may manifest 5-10 days later.

Rehabilitation

1. In patients with severe local envenomation, maintain limb in a functional position. For example, in the leg, equinus deformity of the ankle should be prevented by application of a back slab.
2. Start simple exercises while the patient is still in hospital for restoration of normal function in the bitten part. Conventional physiotherapy after discharge from hospital may accelerate functional recovery of the bitten limb. Give a time table of rehabilitation activities.
3. Functional effects of local envenoming range from persistent stiffness and induration to severe deformity, tissue loss, especially dermal necrosis requiring skin grafting and gangrene requiring debridement and amputation.

Medico-Legal aspects of Snake Bite

Medicolegal cases (MLC) are an integral part of medical practice. The occurrence of MLCs is on the increase. Proper handling and accurate documentation of these cases is of prime importance to avoid legal complications and to ensure that the Next of Kin receives the entitled benefits.

General Guidelines in handling Snakebite cases as Medicolegal issues

1. In emergencies, resuscitation and stabilization of the patient will be carried out first and medicolegal formalities may be completed subsequently. The consent for treatment is implied in all emergencies.
2. All cases of unknown bite should be registered as a Medico-legal case (MLC). Hospitals should maintain a MLC register and the MLC will be initiated and documented in the register. The Medical Officers should prepare a Medico legal Report (MLR) where personal particulars, identification marks and particulars of the person accompanying the patient should be noted. In the MLR, the doctor should write the date and time of examination and also mention the registration number and identity information (Registration number, phone number etc.) as per latest order of the Honorable High Court. **(CRR 2434 of 2017**).
3. Medicolegal documents should be prepared in duplicate, bearing printed serial number at the top, preferably written with a ball point pen and avoiding abbreviations and to be preserved with utmost care in the Medical Record Section of the concerned hospital. Whenever asked by the law enforcing agencies, the Hospital Authority should submit the necessary documents for the need of the case.
4. The police should be informed as per **Section 39 Criminal Procedure Code**. Any failure to report the occurrence of MLC may invite prosecution under **Sections 176 and/ or 202** of Indian Penal Code.
5. In case of discharge/ transfer/ death of such a case in the hospital, the police should be informed.
6. No cause of death should be mentioned in the Medical Certification of Cause of Death (MCCD). The statement that "Exact cause is to be ascertained by postmortem examination" is to be endorsed.
7. In MLCs, the body **will not be handed over to the next of kin/ relatives. The police will be informed, who after medicolegal formalities, will handover the body to the next of kin/ relatives**.

Guidelines to be observed during postmortem examination

8. The autopsy surgeon should proceed for the postmortem examination, only after receiving the following articles from the police:-
    I. Requisition for carrying out the postmortem examination
    II. Inquest report
    III. Dead body challan

9. The dead body should be identified before the autopsy surgeon by the accompanying police personnel, whose name, number and place of posting, should be mentioned in the report.

10. The Autopsy Surgeon may preserve the routine viscera like :-
    a. Stomach along with its contents
    b. First 30 centimeters of intestine
    c. At least 500 grams of liver
    d. Longitudinal halves of each of the kidneys, in such cases, but it is preferable that he/ she should preserve the - Skin from and around the bite mark – for Forensic Science Laboratory investigations.
11. The doctor should handover the preserved articles to the accompanying police after proper packing, sealing, labeling and signing for onward transmission to Forensic Science Laboratory and should keep a receipt of the same.
12. As per the latest order of the Health Department **(HF/SPSRAC/160/2015 dated 3.1.2020)** the preserved article, under normal circumstances should be kept at the mortuary for one month, after which it can be discarded.
13. The doctor should help the next of kin getting the entitled benefits by giving his opinion in the postmortem report, without waiting for the Chemical Examiners' report.
14. The final opinion in the postmortem report may be placed as "**Death was due to the effects of Poisonous Bite, features being consistent to that of snakebite, further opinion, if any, will be given after receipt of chemical examiners' report.".**

Final Remarks:

The way the medicolegal issues will be handled will have a profound impact on the public image of the hospital. Therefore, MLCs must be handled tactfully by the Medical Officers. The administrative authorities must also help in maintaining goodwill and avoiding legal complications. It is hoped that this collation of directives on handling of medicolegal issues will act as a safeguard against procedural lapses and maintain the elite image of the doctors.

Report on Cases of Injury or of Poisoning

Health Institute Name:

Address:

SL No:

Name (In Block Letters) of the Patient …….

Special Mark of Identification……..

Full address and Police Station (In Block Letters)……

C/O……

……

P.O……P.S……District……

Age……Year……Month……Sex……Religion……..

Brought by: Name……Relation……

Address in full……

Occurrence: Date……Time……

Place……P.S……District……

Date and Time of Examination……

Short history of the case and stated by the patient or by the party (if the patient is not able to give the statement):

Clearly write if a snake was seen or killed or picture taken. If not, what lead to the suspicion of a snakebite?

Examination Report including nature of injury, age of injury and caused by:

Clearly write local findings including bite marks, swelling, pain, etc. If any systemic signs of haemotoxicity or neurotoxicity was observed, it must be stated clearly.

Not admitted/ Admitted Ward……

Prognosis……

Valuable with patient (if admitted)……

…… **……**

LTI or Signature of patient **Full Signature of EMO**

Or Patient Party **(Name in Block Letter)**

Instructions while referring

- Inform the need for referral to the patient and/ caregiver.
- In case of transfer of such a case in the hospital, the police should be informed.
- Give prior intimation to the receiving center using available communication facilities.
- Transport in an ambulance equipped with transport ventilator. If ventilator is not available tight-fitting face mask connected to an anesthetic (Ambu) bag should be available. However, do not waste time to get an ideal ambulance.
- Motorbike is a practical alternative in rural areas for rapid transport but third person must sit behind the patient to support on bike.
- If AVS is not available at First contact center transfer to the nearest health facility where AVS is available confirmed by telephone.
- Transfer to a higher health facility (Secondary Care Hospital or Tertiary Care Hospital) where mechanical ventilator and dialysis facilities are available for dialysis and ventilation, if required **after completion of AVS infusion only**.
- During transfer, continue life-supporting measures, insert nasogastric tube and provide airway support with the help of an accompanying staff, if required.
- Send the referral note with details of treatment given clearly mentioning the clinical status **a**t the time of referral.

Basic Minimal & Essential Drugs/ Equipment profile for primary care
Drug: ❖ **AV/ AVS (in domestic fridge if liquid)** ❖ **Adrenaline** ❖ **Neostigmine** ❖ **Atropine** ❖ **Hydrocortisone** ❖ **Antihistaminic (injectables)** ❖ **Analgesics** o **Paracetamol** o **Tramadol (both oral & injectable)** ❖ **NS bottles** ❖ **Antibiotics** o **Inj Amoxiciilin+ clavulanic acid** o **Inj Metronidazole** o **Inj Ceftriaxone** **Equipment** ❖ **Syringes** ❖ **IV set** ❖ **Clean new Glass Test tubes** ❖ **Blood pressure monitor** ❖ **AMBU Bag with mask** **Other desirables** ❖ **Oxygen** ❖ **Laryngeal tube with laryngeal mask airway (LMA)** ❖ **Nasopharyngeal Airways (these can be improvised using size 5 Endotracheal tubes cut to the required length)**

SNAKE BITE MANAGEMENT PROTOCOL

Patient attending Emergency Room of any hospital; H/O Bite (Snake or Unknown)

No Referral in venomous snake bite before 10 vials AVS administration

Respiration & Airway must be restored first of all.
Use AMBU BAG SOS.

Always admit and start IV fluid (NS /5%D); Inj. Toxoid
Remove any ligature
Rapidly assess for any Crisis (Give attention to Crisis first)

(0.25ML ADRENALINE S/C before AVS)

Signs of Envenomation Present
[Progressive local swelling and pain are sure signs of envenomation.]
Add 10 vials of AVS in running fluid & Start in jet (less than 1 hr.)
No Skin Test
Dose of AVS is same for adult, children, pregnant women

No sign of Envenomation,
Reassurance, Continue plan drip slowly for 24 hours

Inj. Adrenaline ½ amp. IM
if Urticaria or any sign of AVS reaction

Scalp itching, Urticaria, fall of BP, Pain, Abdomen and vomiting are ***signs of AVS reaction. Restart AVS when ever reaction is controlled.***

Neurological Signs Present
[Ptosis, hoarseness of voice, choking throat are early Neuro Signs.]
Inj. Atropine 1 amp (0.6mg) IV (must) (Children-0.02mg/kg, Min-0.1mg), then Inj. Neostigmine 3 ML (1.5mg) IV or IM(children-0.04mg/kg)
Ptosis & neck weakness will improve in one hour in cobra bite only
(No improvement in Krait & R viper bite)
Follow Maintenance Dose after initial response

Definite H/O : ***Viper bite or signs of bleeding***
[Bleeding gum, Haematuria, Blood stained sputum or bleeding from bite mark or old ulcer]
Do 20 WBCT*: a) clotted → repeat 20WBCT every hourly for next 4 hours --> if comes not clotted in between , follow below steps*
b) not clotted (after 20 min): viper bite confirmed

Maintenance Dose

Systemic antibiotic if cellulitis is evident

If active bleeding persists after one hr, repeat 2nd 10 vials of AVS here

If Improvement occurs after 30 minutes
Maintenance Dose: Injection Neostigmine IV, IM or SC (0.5 mg) Children-0.01 mg/kg every 30 minutes for 5 doses. Atropine 0.6 mg iv Continuous infusion over 8 hr. Children 0.02mg/kg over 8 hr iv infusion.

Neurological Signs not improving after 1st dose of Atropine + Neostigmine;
Repeat both Atropine + Neostigmine after one hour;
Infuse 2nd dose of 10 vials of AVS rapidly 2 hr after 1st dose.
Neurodeficit not improving 1 hr after 2 nd A +N ;
Transfer for artificial ventilation

Artificial ventilation SOS

Discharge only when no Neuro deficit present

Transfer to Referral Hospital (2nd Hospital)
(where lab facility for Kidney function test is present)
After 6 hrs. of receiving last dose of 10 vials of AVS → Repeat 20 WBCT
2nd 20 WBCT = not clotted; Repeat 10 vials of AVS in fluid in jet.

Transfer to Urology for Dialysis
(If Haematuria present or Kidney function abnormal). No AVS after 30 Vials

Discharge only when Kidney function stable

Emergency Management : discontinue AVS temporarily; 0.5mg (children 0.01 mg/kg) of 1:1000 adrenaline IV/ IM
Prevention of ASV reaction: Adult- 100 mg hydrocortisone & HI antihistaminics (10 mg chlorpheriramine maleate/ 22.5 mg phenimarine maleate)
Children- 2mg/kgof hydrocortisone & 0.1-0.3 mg/kg of antihistaminics IV

Essential drugs & equipment list

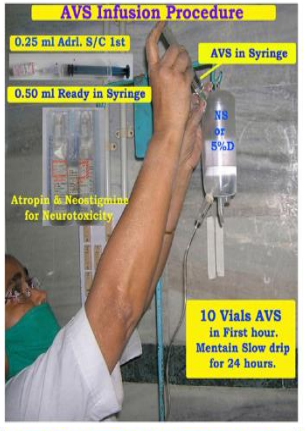
AVS	Neostigmin	Tramadole	Glass syringe / Glass test tubes	Laryngeal tube
Hydrocortisone	Atropine	Antibiotics	Ambu Bag with mask	
Antihistaminics Inj.	Paracetamol	NS / DS	Oxygen Cylinder	

No Swelling in **Scorpion bite** but tremendous pain

In **Krait bite** no local sign, only Neurological sign & may not be ant bite mark, nor any H/o bite; H/o open floor bed is suggestive. May present with pain in throat, abdomen or joints

20WBCT

AVS Infusion Procedure



For Children: AVS same dose.

Other drugs according to body weight :
Adrenaline : 0.01 mg/Kg ,
Neostigmine : 0.04 mg/Kg,
Atropine : 0.05 mg/ Kg.

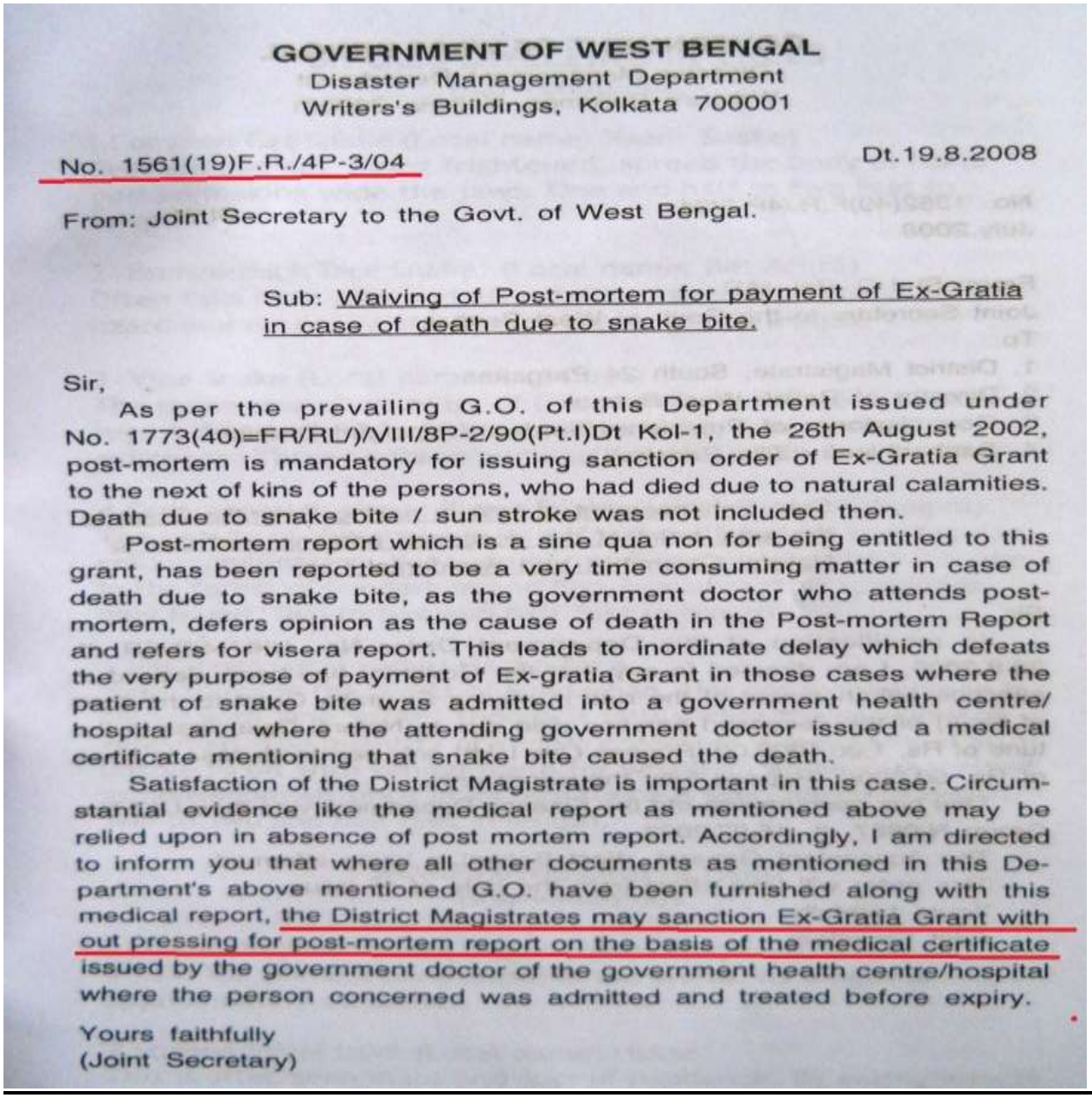
The West Bengal Health Department, in collaboration with the Poison Information Centre, R G Kar Medical College, has developed two Mobile Applications on First aid in Snake bite, Dos and Don'ts, AVS availability etc. which can be downloaded for free from Google Play Store.

These are available as "Snake Bite and Poison Information" (অবিলম্বে) and "Snake Bite Prevention and Rescue" App respectively.

QR CODE for "Snake Bite and Poison Information (অবিলম্বে)"

QR CODE for "Snake Bite Prevention and Rescue

Annexure I



GOVERNMENT OF WEST BENGAL
Disaster Management Department
Writers's Buildings, Kolkata 700001

No. 1561(19)F.R./4P-3/04 Dt.19.8.2008

From: Joint Secretary to the Govt. of West Bengal.

Sub: Waiving of Post-mortem for payment of Ex-Gratia in case of death due to snake bite.

Sir,

As per the prevailing G.O. of this Department issued under No. 1773(40)=FR/RL/)/VIII/8P-2/90(Pt.I)Dt Kol-1, the 26th August 2002, post-mortem is mandatory for issuing sanction order of Ex-Gratia Grant to the next of kins of the persons, who had died due to natural calamities. Death due to snake bite / sun stroke was not included then.

Post-mortem report which is a sine qua non for being entitled to this grant, has been reported to be a very time consuming matter in case of death due to snake bite, as the government doctor who attends post-mortem, defers opinion as the cause of death in the Post-mortem Report and refers for visera report. This leads to inordinate delay which defeats the very purpose of payment of Ex-gratia Grant in those cases where the patient of snake bite was admitted into a government health centre/ hospital and where the attending government doctor issued a medical certificate mentioning that snake bite caused the death.

Satisfaction of the District Magistrate is important in this case. Circumstantial evidence like the medical report as mentioned above may be relied upon in absence of post mortem report. Accordingly, I am directed to inform you that where all other documents as mentioned in this Department's above mentioned G.O. have been furnished along with this medical report, the District Magistrates may sanction Ex-Gratia Grant with out pressing for post-mortem report on the basis of the medical certificate issued by the government doctor of the government health centre/hospital where the person concerned was admitted and treated before expiry.

Yours faithfully
(Joint Secretary)

Annexure II

Government of West Bengal
Department of Disaster Management
Writers' Buildings, Kolkata-1.

No. 1482(40)-FR/4P-3/04 Dated 7.8.2008

From: Sri D.Pal, IAS
Jt. Secretary to the Govt. of West Bengal.

To: 1. The District Magistrate, ...

P.O. Dist.

2. Director of Relief, West Bengal, Tran Bhavan,
87 A, S.N.Banerjee Road, Kol –14.
3. Commissioner, Presidency/Burdwan/Jalpaiguri Division.
4. Sa. bhadhipati Zilla Parishad.

Sub: Enhancement of rate in paying Ex-gratia grant to the next-of-kin(s) of the indigent person died by Sun Stroke/Snake Bite.

Sir,

In modification of this Deptt. Order No. 1714(40)-FR dt. 11.10.06, I am directed to say that, the Governor has been pleased to sanction enhancement of the rate in paying Ex-gratiaG rant to the next-of –Kin(s) of the indigent person who died as a result of Sun Stroke/Snake Bite to the tune of Rs. 1,00,000/-(Rupees one lakh) only per death case in place of Rs. 50,000/- (Rupees fifty thousand) only.

This has the concurrence of the Finance Deptt. vide their U/O.No. Group-N,0761 dt. 28.7.08

This Accountant General, West Bengal is being informed. This order will take effect from the date of its issue.

Yours faithfully,
Joint Secretary.

No. 1482/1(22)-FR Dated: 7.8.08

Copy forwarded for information and necessary action to the :-

1. A.G. (A&E), W.B, Treasury Building, Kol-1
2. A.G.(Audit), W.B, Treasury Building, Kol-1
3. Finance (Budget) Deptt.of this Govt.
4. Finance (Group-E) Deptt.of this Govt
5. Treasury Officer,.....

Joint Secretary.

Notes

Chapter 2: Animal Bite Case Management

Rabies Epidemiology and Pathogenesis:

Rabies is an acute viral disease that causes fatal encephalomyelitis in virtually all warm-blooded animals including man. The virus is found in wild and some domestic animals and is transmitted to other animals and humans through their saliva. It is vaccine preventable disease caused by rabies virus of the Lyssavirus genus, with in the family Rhabdoviridae. Most deaths are estimated to have occurred in Asia (59.6%) and Africa (36.4%).

In India, dogs & cats are responsible for about 97% human rabies followed by other wild animals such as mongoose, foxes, jackals, and wild dogs, and occasionally by horses, donkeys, monkeys, cows, goats, sheep, and pigs. Rodents, rats and bandicoots, squirrel, rabbits, birds, and bats are generally not known to transmit rabies. Rabies is endemic in India with the exception of Andaman, Nicobar and Lakshadweep Islands. Different studies quotes different figures of Animal Bites incidence and deaths due to rabies in human. The Million Deaths Study 2012, India has estimated 12700 deaths due to furious rabies. The number of Animal Bites reported under IDSP has increased from 42 lakhs in 2012 to 74 lakhs in 2018. The deaths due to suspected rabies as reported by 30 out of 36 States and UTs during 2017 were 593.

In West Bengal, nearly seven lakh ninety thousand animal bites have been reported in 2019 and around seven lakh twenty nine thousand cases reported in 2020. Of which 59% are dog, 35% are cat , 3% are monkey and 3% other animal mediated. Majority of bites are Cat II bites (62%) followed by Cat I bite (23%) and rest 15% as Cat III. There were 52 rabies deaths in West Bengal on 2016 which came down to 22 deaths in 2020

Pathophysiology:

Rabies virus is a bullet shaped enveloped virion (180 nm x 75 nm in size) belongs to Lyssavirus genus and Rhabdoviridae family. Seven distinct genotypes of rabies virus are known to occur. The classical rabies virus (RV-genotype 1) and its field strains are known worldwide and causes rabies in humans and animals.

Most common way of entry of rabies virus into the body is either through saliva or infected neural tissue via bite wounds or open cuts in the skin or mucous membrane and not through the intact skin. Non-bite exposure methods are inhalation of aerosolized rabies virus, cornea/organ transplants and contamination of abrasions, open wounds, mucous membranes with rabies virus laden saliva or

with infectious material such as brain tissue from a rabid animal.

Incubation period or eclipse phase is highly variable from 2 weeks to 6 years (average: 2 to 3 months) according to the concentration of the virus, inoculation site and density of innervation. Bites on the head, face, neck and hands with bleeding offer the greatest risk and are generally associated with shorter incubation period due to decreased length and greater number of neurons. The consequence of an exposure to RABV depends on several factors, including the severity of the wound, the location of the bite on the body, the quantity and variant (genotype) of virus inoculated into the wound(s), and the timeliness of post-exposure prophylaxis (PEP).

Without PEP, the average probability of developing rabies following a bite by a rabid animal to the head is 55%, upper extremity 22%, the trunk 9% and a lower limb 12%.

Virus load in the saliva of RABV-infected dogs varies during the disease and influences the risk of infection for human bite victims. After virus gets inoculated, virus replication in muscle takes place. Next, virus binds to nicotinic acetylcholine receptors at neuromuscular junction. Viruses then travel within axon in peripheral nerves via retrograde fast axonal transport. Replication in motor neurons of the spinal cord and local dorsal root ganglia and rapid ascent to brain. Infection of brain neurons with neuronal dysfunction is noted. Spread of rabies virus away from the CNS (centrifugal spread) along neuronal pathways, particularly via the parasympathetic nervous system, which is responsible for infection of the salivary glands and skin. No immune response is detectable in most cases of the human rabies at 7–10 days after the onset of clinical signs and immunosuppression has no effect on the outcome of rabies.

Brain, spinal cord and peripheral nerves show ganglion cell degeneration, perineural as well as perivascular infiltration of mononuclear cells and neuronophagia. Vascular lesions like thrombosis and hemorrhages in the brain stem, hypothalamus and limbic system may be noticed. Degeneration of the salivary and lacrimal glands, pancreas and adrenal medullae are observed focally outside the nervous system.

RABV is not found in blood. Human-to-human transmission of RABV is extremely rare and this very low risk should not hinder the care of patients. The only documented cases of human-to-human transmission occurred via tissue and organ transplants from RABV-infected individuals, and a single case of likely perinatal RABV transmission.

Disease Manifestation:

The WHO case definition for human rabies defines a human clinical case as follows: *A subject presenting with an acute neurological syndrome (encephalitis) dominated by forms of hyperactivity (furious rabies) or paralytic signs (paralytic rabies) progressing towards coma and death, usually by cardiac or respiratory failure, typically within 7–10 days after the first sign.*

Rabies affects brain stem function, causing Hydrophobia (fear of water), Aerophobia (fear of breeze), and/ or Photophobia (fear of light), and finally resulting in respiratory paralysis and death. In 80% of humans, rabies manifests as Neurologic or Furious types and remaining 20% manifests as Paralytic or Dumb type.

The furious rabies manifests as Hyperactivity (anxiety, agitation, running, biting, bizarre behavior alternating with periods of calm) which may occur spontaneously or may be precipitated by tactile or auditory, visual or other stimuli.

The most characteristic symptom is spasm of the pharyngeal muscles often triggered by an attempt to drink water (hydrophobia) or by blowing air on patient's face (aerophobia). Spasmodic contractions of the muscles may spread to the respiratory and other muscles leading to attacks of apnea.

The paralytic or dumb rabies manifests as acute progressive ascending myelitis, symmetrical or asymmetrical with flaccid paralysis, pain and fasciculation in the affected muscles with mild sensory disturbance. A complete paraplegia develops eventually with fatal paralysis of the respiratory and pharyngeal muscles.

Post-exposure prophylaxis

The comparatively long incubation period provides an opportunity for highly effective PEP.

Following guiding points are stated here

I. Decision to Treat:

a) Rabies is endemic in India; so, management of animal bites is essential.

b) Suspect all warm-blooded animal bites, even scratches.

c) All animal bites in forest or all wild animal bite should be treated as Category III exposures.

d) Bites by Bats or Rodents do not ordinarily necessitate rabies vaccination. However, in unusual circumstances cases may be considered for vaccination in consultation with an expert in the field of rabies. (Example: exposure to domestic rodents does not require PEP but if the rodent is wild then the bite victim may be considered for PEP in consultation with the expert). A mouse is usually a domestic rodent, but for a large size rat it is difficult to determine whether it is domestic or wild. Vaccination may be necessary in case of bite by such rats).

e) Human to Human transmission of Rabies: Negligible chance of transmission . No post exposure prophylaxis is advocated unless very close contact with secretions of person affected with rabies. In that case precautionary post exposure prophylaxis can be administered. Not to collect cornea, organ for transplant from rabies affected person.

f) Close contact with rabid pet requires vaccination

II. Observation of Biting Dog/Cat:

Initiate Post Exposure prophylaxis as soon as possible following animal bite. 10 days observation is applicable only for dog and cat, natural history of rabies in other mammals are not clear, hence 10 days observation is not valid for other mammals.

If suspected dog and cat remains healthy after 10 days of observation period, Post exposure prophylaxis can be modified to Pre exposure prophylaxis by skipping Day 14^{th} Dose in case of Intramuscular regimen. If Intradermal route of application is followed it must be continued as per schedule irrespective of status of biting animal.

III. Vaccination Status of Biting Animal:

Animal who received vaccine for rabies do no suffer or transmit rabies. As incidence of vaccine failure among pet animals are frequent due to various factors like-improper administration,

inadequate dose, poor quality vaccine or poor immunological status of animal etc, post exposure prophylaxis is advocated irrespective of vaccination status of biting animal.

IV. Provoked vs Unprovoked Bite:

Provoked bite does not warrant that animal is not rabid, hence post exposure prophylaxis is needed irrespective of provoked or unprovoked bite.

V. Contra indication vs Precautions:

Rabies is nearly 100% fatal disease hence there is no contraindication for post exposure prophylaxis. Pregnancy, old age, newborn or infant, other co morbidities are not contraindication of rabies vaccination. Rabies vaccine is very safe vaccine, and it has no adverse outcome for pregnant or nursing mothers.

If patient is suffering from Malaria and receiving chloroquine, in that case intradermal regimen may be less effective and needed intramuscular regimen instead.

In case of past history of anaphylaxis with a type of rabies vaccine, different type of vaccine to be used for Post exposure or pre-exposure prophylaxis.

After vaccination person need to be watched for 15 minutes for any adverse event following immunization.

Rabies deaths occur mainly in those who cannot access timely and effective PEP. Prompt PEP following severe exposures is 100% effective in preventing rabies. However, delay in seeking PEP, improper wound care, unnoticed wounds, direct nerve inoculation, and lack of patient compliance with vaccination schedules, among other factors, contribute to PEP failure and subsequent death.

Guide for Post-Exposure Prophylaxis (PEP)

Category	Type of contact	Recommended Post Exposure Prophylaxis
I	Touching or feeding animals Licks on intact skin	- None, if reliable case history is available. - Wash exposed area with soap and water and apply antiseptic.
II	Nibbling of uncovered skin. Minor scratches or abrasions without bleeding	1. Wound management. 2. Administer anti-rabies vaccine immediately.
III	Single or multiple transdermal bites or scratches. Contamination of mucous membrane with saliva (i.e. licks). Licks on broken skin.	1. Wound Management. 2. Administer rabies immunoglobulin. 3. Administer anti-rabies vaccine immediately.

NB: If rabies immunoglobulin (RIG) is not available on first visit, its use can be delayed by a maximum of 7 days from the date of first dose of vaccine. If the patient comes even months after having been bitten, he/she should be dealt with in the same manner as if the bite has occurred recently.

VI. Approach to Post Exposure Prophylaxis:

PEP is a three-pronged approach. All the three components are equally important and must be done simultaneously as per category of exposure

1. Wound management;
2. Active Immunization with Anti-Rabies Vaccines (Rabies Vaccine)
3. Passive immunization with Rabies Immunoglobulin (RIG)

All three components are equally important in prevention of rabies following animal bite.

1. Wound management:

1.1. Wash the wound immediately (as early as possible) under running tap water for at least 15 minutes. Use soap or detergent to wash the wound (if soap is not available then use water only to wash the wound). After thorough washing and drying the wound apply antiseptic e.g. Povidone iodine, etc.

- ❖ Following a suspected rabid animal bite wound washing with running tap water is one of the most important and the first step of PEP to do immediately, as wound

washing remove the traces of saliva (containing the lethal rabies virus) from the wound. Then wash with soap so that the virus, if still present is inactivated. This simple process is greatly eliminates the risk of rabies infection.

- ❖ Don't apply irritants viz. chillies, soil, oils, turmeric powder, lime, salt, plant juice etc.
- ❖ Don't touch the wound with bare hands.
- ❖ Wound washing must be performed even if the patient reports late.

1.2. Postpone suturing if possible; if suturing is at all necessary, it should be performed after cleaning and infiltrating RIG at the depth of wound and only minimum number of loose suture should be applied.

Don't cauterize.

1.3. Administer systemic antimicrobial and tetanus toxoid if necessary (follow usual norm of wound management in this regard).

2. Passive immunization (immunoglobulin/anti-sera):

2.1. Two types of anti Rabies immunoglobulin area available:

a) **Human Rabies Immunoglobulin (HRIG): 20 IU/kg body wt, maximum 1500 IU**

b) Equine Rabies Immunoglobulin (ERIG): 40 IU/kg body wt, maximum 3000 IU

Either of the above is to be used where indicated – i.e. all Category III exposure and also Category II exposure in case of immune-compromised persons.

2.2. Local infiltration of rabies immunoglobulin: Infiltrate into all Category III wounds.

RIG should be infiltrated in the depth and around each of the wounds to inactivate the locally present rabies viruses. Infiltrate the entire immunoglobulin dose, or as much as possible (avoiding compression syndrome), in the depth and around the wounds.

As per the new recommendation/ guideline of WHO and GOI, injecting the remaining volume of RIG intramuscularly at a distance from the wound provides little or no additional protection against rabies as compared with infiltration of the wound(s) alone. Hence the remaining RIG can be given to other patients using separate syringe /needle.

If RIG is insufficient (by volume) to infiltrate all the wounds, dilute it with sterile normal saline to a volume sufficient to infiltrate all wounds.

2.3. Wounds on tip of finger/toe, ear lobe, nose, external genitalia or around the eye can be

safely injected with RIG, provided the injection is not done with excessive pressure which can cause compression syndrome.

2.4. Suspected exposure to aerosols of rabies virus (as example accidental exposure in labs) is to be treated as category III exposure. In such cases ARV to be given as per normal schedule but RIG is to be given in IM route.

2.5. RIG must never be given intravenously.

3. Active immunization (Anti Rabies Vaccination):

3.1. Route of inoculation: Intramuscular or Intradermal.

3.2. Site of inoculation: Deltoid muscle or anterolateral part of thigh. Not recommended in gluteal region, since there is chance of low absorption due to presence of fatty tissue. In case of infant and young children, anterolateral part of thigh is the preferred site.

3.3. Post exposure Vaccine schedule:

The vaccination schedule may be either of the following. However, in healthcare institutions, the latter (Intradermal Regimen) is more cost effective and is mandatory in State Government set-ups except in documented exceptional cases.

3.3.1. Essen Intramuscular Regimen: 1-1-1-1-1

- One dose comprises of the entire content of one vial (content may be 0.5ml or 1ml) into the deltoid /anterolateral aspect of thigh.
- One dose each on day 0, 3, 7, 14 and 28.
- Infiltrate anti-rabies immunoglobulin locally on day 0 as described under Passive Immunization.

3.3.2. Intradermal Regimen (approved in India)

- 2 site regimens (Updated Thai Red Cross regimen)
- Dose : 0.1 ml (2 doses per visit)
- Site : Upper arm over each deltoid/ antero- lateral aspect of thigh
- Schedule: 2- 2- 2- 0- 2

Day	0^{th}	3^{rd}	7^{th}	14^{th}	28^{th}
Number of Site(s) to be infiltrated	2	2	2	0	2

- So, 2 injections (left & right arm) per visit x 4 visits in total i.e. on Days- 0, 3, 7 and 28.

The above ID regimen is as effective as IM regimen, if not more, and is very cost-effective. Hence it is recommended in all Govt. Anti-Rabies Clinics where a multiple no. of cases attend on a single day.

3.3.3. General guideline for use of IDRV:

Only the rabies vaccine (lyophilized vaccine along with the diluent of specified volume) approved by DCGI for ID/ IM administration should be used for ID route. The vaccine should have stated potency of ≥ 2.5 IU per IM dose. The same vaccine is used for ID administration as per the stated schedule.

- A dose of 0.1 ml of vaccine, irrespective of reconstituted volume for IM route (0.5 ml or 1 ml) is administered per ID site as per the stated schedule.
- Intradermal injections must be administered by staff trained in this technique.
- Vaccine when given intradermally should raise a visible and palpable “bleb” in the skin.
- If the ID dose is inadvertently given subcutaneously or intra-muscularly or in the event of spillage, a new dose should be given intradermally (maybe at a nearby site).
- Animal bite victims on chloroquine therapy (for cure or prophylaxis of malaria) and immune-suppressed persons should be given ARV by IM route, not by ID route.

3.3.4. Points to remember for PEP:

- **Day 0 is the day of 1st dose of vaccine given, not the day of bite.**
- Never inject the vaccine in gluteal region.
- Reconstituted vaccine to be used immediately. However, in unforeseen delay the vaccine vial should be stored at 2-8°C after reconstitution and should be used within 6 hours of reconstitution.
- Dose is same for all age groups.
- Switching the route of administration from IM to ID or vice versa and switch over from one type of modern rabies vaccine to the other during PEP is not recommended as routine. However, whenever this is absolutely required, PEP need not be restarted, and the regimen should be continued/ resumed as per the new vaccine / route of administration (ref.- WHO recommendation and GOI Guideline for rabies prophylaxis).
- As for all immunizations, animal bite victim should be kept under medical supervision for at least 15-20 minutes after administration of ARV as well as ERIG.

VII. Post Exposure Prophylaxis in special case scenario:

Management in immune- compromised patients:

- Thorough wound washing and antisepsis as described above.
- Local infiltration of RIG in both Category II and Category III exposure.
- Complete course of ARV by IM route in Category II and III exposures.
- If facilities are available, anti-rabies antibody estimation should be done 14 days after the completion of course of vaccine to assess the need of additional doses of vaccine.

HIV-infected and other potentially immunocompromised persons who are clinically monitored and well-managed, such as HIV-infected individuals receiving antiretroviral therapy (ART), are not considered immunocompromised and have been shown to respond normally to rabies and other vaccines

Vaccination of pregnant and lactating women – Rabies vaccines and RIG are safe and effective in pregnant and lactating women.

VIII.Guide for Pre-Exposure Prophylaxis (PrEP):

- Intramuscular regimen (entire vial x 1 site) on days 0, 7 and booster on either day 21 or 28

  OR

  Intradermal regimen (0.1ml x 1 site) at day 0, 7 and booster on either day 21 or 28

- Persons at high risk of exposure should get serum antibody level measured every 6 months during the initial two years period after the primary vaccination and take a booster dose if the level falls below 0.5 IU/ml. Routine booster doses are not recommended for general people.
- Vaccine induced immunological memory persists in most cases for years. A booster would be recommended only if rabies virus neutralizing antibody titers have dropped to less than 0.5 IU/ ml.

1. Management of re-exposed cases after a full PEP or PrEP:

In case of re-exposure after a full course and documentation of (Pre/Post-exposure) IM or ID vaccination, irrespective of category of exposure or time since previous vaccination -

- Proper wound toileting should be done.
- Doses only on day 0 and 3 (these actually serve as booster doses).
- Either intramuscular (entire vaccine vial) or intra-dermal injection (0.1ml) at one (1) site.
- No RIG needed.
- If previous course of vaccination was partial/ irregular, treat it as a fresh case and give full course as usual.
- Re-exposure following PEP with a nerve tissue vaccine (NTV) or if previous PEP or PrEP is not clearly documented - Treat as a fresh unvaccinated case (Full schedule as per category).
- **If the animal bite victim has documented proof of complete PEP or PrEP within last 3 months, then adequate wound washing would be required in case of re-exposure, but no vaccine or RIG is needed in such cases.**

2. **Deviation from recommended PEP/ PrEP vaccination schedule**:

- Every effort should made to adhere to the recommended PEP/ PrEP schedule, especially for the first 2 days of treatment.
- The recommended PEP should be informed clearly (both verbally and in a written prescription)
- The first three doses of the PEP (i.e. doses on day 0, day 3 and day 7) should be completed maximum within 10 days to achieve effective immunity against the rabies virus.
- One or two days deviation do not necessitate re-starting of the vaccination schedule.
- Deviation of a few days will not necessitate fresh vaccination from the beginning of the course.
- For most minor delay or interruptions, the vaccination schedule can be shifted and resumed as though the patient were on schedule. [See FAQ for example].

SUMMARY OF ANTI- RABIES VACCINATION SCHEDULE AS PER ROUTE OF ADMINISTRATION

Type of Prophylaxis	Route of Administration	Dose of Vaccine	Day of Dose	No. of Injections	Total no. of visit	Site of Injection visit
Post Exposure Prophylaxis	**Intra Dermal**	**0.1 ml per dose**	**Day 0, 3, 7 & 28**	**2**	**4**	Adult: Deltoid Muscle Infants and small children: Anterolateral thigh
	Intra Muscular	**1 entire vaccine vial**	**Day 0, 3, 7, 14 & 28**	**1**	**5**	
Pre Exposure Prophylaxis	**Intra Dermal**	**0.1 ml per dose**	**Day 0, 7 and booster on either day 21 or 28**	**1**	**3**	
	Intra Muscular	**1 entire vaccine vial**	**Day 0, 7 and booster on either day 21 or 28**	**1**	**3**	
Re -exposure	**Intra Dermal**	**0.1 ml per dose**	**Day 0 & 3**	**1**	**2**	
	Intra Muscular	**1 entire vaccine vial**	**Day 0 & 3**	**1**	**2**	

NB: For exceptions and details please refer to the sections VI, VII &VIII.

IX. Arrangements required in ARC

1. **Physical Infrastructure**:
   a) Visible signage with daily time schedule
   b) Visible flow chart/ algorithm of "decision to treat"
   c) Visible IEC messages
   d) Weighing scale
   e) Wound washing facility (tap water or tube well or clean covered stored water)
   f) Refrigerator with a calibrated thermometer & Vaccine Carrier

2. Logistics

a) A.R.V. approved by DCGI for ID/IM route.

b) Rabies Immunoglobulin

c) Consumable: self-mounted insulin syringes (AD), Dressing Kits, Soap and Gloves

d) IV Fluid and Emergency Drug Kit (both in ARC & ER)

3. Animal Bite Exposure Register & Treatment Card

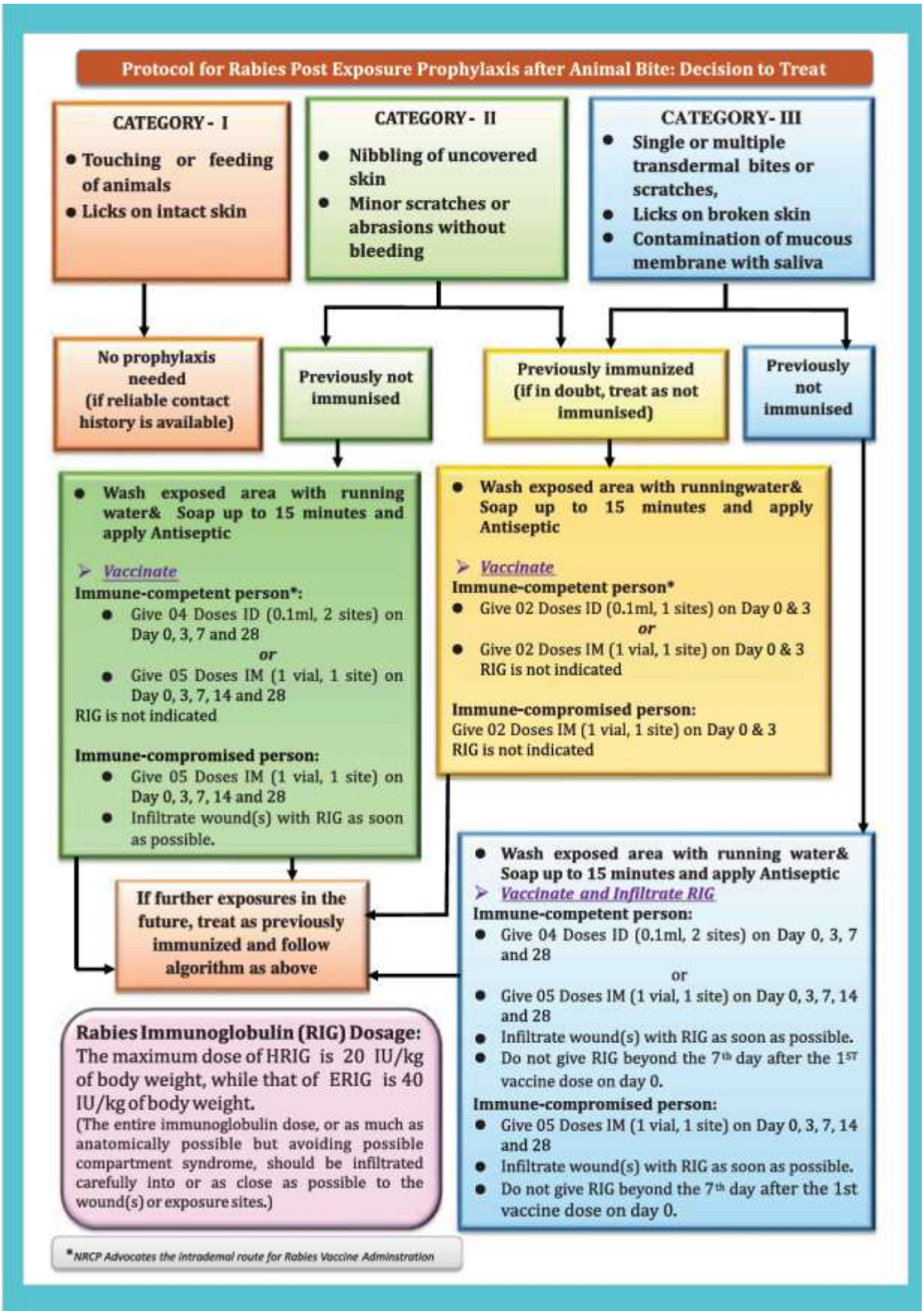
a) ARC monthly reporting formats (NRCP –M03)

b) Animal Bite Exposure Register

c) Formats for NRCP Monthly Reporting

X. State & District level Zoonosis Committee (DLZC)

These committees have been formed, as per a MOHFW (GOI) directive, in order to facilitate the implementation of "One-Health Approach" for prevention & control of zoonotic diseases. The State Level Committee is headed by the Mission Director, NHM and the District Committee is headed by the District Magistrate. These committees are forums for intersectoral coordination among Health, Animal Resource Development, Medical Education, Veterinary Education, Forest Dept. etc.


Protocol for Rabies Post Exposure Prophylaxis after Animal Bite: Decision to Treat
CATEGORY - I
Touching or feeding of animals
Licks on intact skin
CATEGORY - II
Nibbling of uncovered skin
Minor scratches or abrasions without bleeding
CATEGORY- III
Single or multiple transdermal bites or scratches,
Licks on broken skin
Contamination of mucous membrane with saliva
No prophylaxis needed (if reliable contact history is available)
Previously not immunised
Previously immunized (if in doubt, treat as not immunised)
Previously not immunised
Wash exposed area with running water& Soap up to 15 minutes and apply Antiseptic
Vaccinate
Immune-competent person*:
Give 04 Doses ID (0.1ml, 2 sites) on Day 0, 3, 7 and 28
or
Give 05 Doses IM (1 vial, 1 site) on Day 0, 3, 7, 14 and 28
RIG is not indicated
Immune-compromised person:
Give 05 Doses IM (1 vial, 1 site) on Day 0, 3, 7, 14 and 28
Infiltrate wound(s) with RIG as soon as possible.
Wash exposed area with runningwater& Soap up to 15 minutes and apply Antiseptic
Vaccinate
Immune-competent person*
Give 02 Doses ID (0.1ml, 1 sites) on Day 0 & 3
or
Give 02 Doses IM (1 vial, 1 site) on Day 0 & 3
RIG is not indicated
Immune-compromised person:
Give 02 Doses IM (1 vial, 1 site) on Day 0 & 3
RIG is not indicated
Wash exposed area with running water& Soap up to 15 minutes and apply Antiseptic
Vaccinate and Infiltrate RIG
Immune-competent person:
Give 04 Doses ID (0.1ml, 2 sites) on Day 0, 3, 7 and 28
or
Give 05 Doses IM (1 vial, 1 site) on Day 0, 3, 7, 14 and 28
Infiltrate wound(s) with RIG as soon as possible.
Do not give RIG beyond the 7th day after the 1ST vaccine dose on day 0.
Immune-compromised person:
Give 05 Doses IM (1 vial, 1 site) on Day 0, 3, 7, 14 and 28
Infiltrate wound(s) with RIG as soon as possible.
Do not give RIG beyond the 7th day after the 1st vaccine dose on day 0.
If further exposures in the future, treat as previously immunized and follow algorithm as above
Rabies Immunoglobulin (RIG) Dosage:
The maximum dose of HRIG is 20 IU/kg of body weight, while that of ERIG is 40 IU/kg of body weight.
(The entire immunoglobulin dose, or as much as anatomically possible but avoiding possible compartment syndrome, should be infiltrated carefully into or as close as possible to the wound(s) or exposure sites.)
*NRCP Advocates the intradermal route for Rabies Vaccine Administration

FREQUENTLY ASKED QUESTIONS ABOUT ANIMAL BITE & RABIES

1. Is it permissible to change the vaccine type during the course of vaccination with ARV?

Ans: It is desirable that the same type of modern rabies vaccine is used through the full course of vaccination with ARV. However, when completion of PEP with the same vaccine is not possible, switching may be done. It does not necessitate fresh starting of the course. [Note that only the cell culture vaccines that are approved by Govt. of India are recommended for ID route vaccination]. Please also note that a course of vaccine should be either ID or IM. Switching from IM to ID or reverse, in the middle of the course, is not advisable but may be done if absolutely required.

2. A monkey bite patient received the first two doses of ARV on time (on days 0 and 3) and also RIG on day 0. Then he defaulted for the third dose of ARV (day 7). However, the patient comes back on day 9. What should be done?

Ans: In this case, day 0 and 3 inj. were given and inj. due on day 7 could not be given as the patient did not turn up. When he comes back on day 9, the two remaining doses of vaccine must be given as close to the original dates of the schedule as possible i.e. the pending 3rd dose on day 9 itself and the fourth dose on day 28 as usual.

The first two doses of ARV are the most important. For the 3rd or 4th doses two or three days deviation may be accepted (although not recommended). So the running schedule can be resumed if a patient comes back a few days late.

3. A boy bitten by a cat received the first three doses of ARV in time (Day-0, Day-3 and day 7). In between 3rd and 4th shot of vaccine the boy got scratched again by a monkey drawing blood. What should be done?

Ans: No need to repeat the vaccine schedule. Just complete the usual vaccination up to 4th dose as per schedule. As first 3 doses of vaccination would be enough to produce antibodies, immunoglobulin is not needed for the latter incident.

4. If for some reason, IDRV (intradermal rabies vaccine) cannot be given in deltoid region, what are the alternative sites?

Ans: The two doses of ID injection have to be given at two sites that do not share the same lymphatic drainage. So, deltoid region of the two arms are all right. However, if deltoid region cannot be used for some reason, ID inj. can be given in suprascapular region or anterolateral aspect of thigh.

5. Where is IM regimen of ARV particularly recommended i.e. ID regimen is contraindicated?

Ans: In immune-compromised persons, ID route is not recommended for PEP. IM regimen is to be used in such persons. The same is true for persons who are on chloroquine for treatment or prophylaxis of malaria.

6. Why is RIG considered as life-saving?

Ans: Administration of Anti-Rabies Vaccine stimulates production of neutralizing antibodies by the patient`s immune system. Protective levels of antibodies (of more than 0.5 IU/ml of serum) appear as late as 7 to 14 days after the initial doses of vaccine (window period). Therefore, in case of shorter incubation period the patients are vulnerable to develop rabies during this window period of 7 to 14 days. RIGs are readymade anti-rabies antibodies and provide immediate passive immunity to rabies.

7. A boy bitten by a dog, has come to a PHC-OPD 3 days after the bite. Is wound washing necessary at this stage?

Ans: Yes. Since the rabies virus can persist and even multiply at the site of bite for a long time, wound washing must be performed even if the patient reports late.

8. A man, complaining of scratches by a monkey drawing blood, comes to the OPD 4 days after the incident. The M.O. examines the wound and decides to give anti-rabies vaccine. Should he also be given RIG although it is 4 days late?

Ans: Yes. RIG should be given at the first opportunity (but not beyond 7 days of initiation of ARV).

9. An animal bite patient presented at BPHC on the day of bite itself and has been given ARV inj on the day of bite. The second dose of ARV has also been given on Day-3. But RIG was not available at that time and would become available after Day-5. Can it be administered on Day-6 to that patient?

Ans: Yes. it can be administered up to the seventh day after the administration of the first dose of ARV, but not beyond that. Although it is recommended that RIG be administered on day 0 itself (i.e. the day of first dose of ARV), it is not essentially required that RIG and first ARV are given on the same day.

10. Why RIG should not be administered after seventh day of first vaccination?

Ans: Beyond the seventh day (after 3 doses of ARV have been administered), RIG is not indicated since an antibody response to ARV would have occurred by that time and administration of RIG at this stage can suppress the immune response of the patient to the ARV received.

11. Can RIG alone be administered if inj. ARV is not available at that time?

Ans: If the category of bite deserves administration of RIG (as per treatment protocol), the same should be given as early as possible even if inj. ARV is not available at that time. However, inj. ARV should follow at the earliest opportunity.

12. Splash of animal saliva in eye or on lips: What to do?

Ans: Contact of cornea or conjunctiva with animal saliva constitutes Category III exposure.

Thorough rinsing with water is to be done immediately.

Thereafter RIG is to be instilled as drops in the eye in normal dilution (as is used for injection).

If animal saliva falls on lips, the saliva is to be washed away thoroughly with water and mouth is to be rinsed well. Then the lips may be rinsed with RIG in normal dilution.

13. Why is observation of 10 days recommended in dog or cat, but not in bite by any other animal?

Ans: The observation period of 10 days is valid only for dogs and cats due to the fact that the incubation period of rabies is known and quite specific in dogs & cats, unlike in other animals. If the biting dog or cat had rabies virus in its saliva when it did the biting, research shows that it would die or show clinical signs of rabies within 10 days of bite.

However, this observation period does not come to any help if ID route is used for ARV administration, since the course of ID vaccination does not vary with the status of the animal.

14. Can rabies be transmitted from human- to- human?

Ans: Human-to-human transmission has never been confirmed other than organ transplantation. Organ transplanted from rabies –infected donors can transmit the infection to the organ recipient. Individuals with symptoms of encephalitis before death should, therefore be excluded as organ donors. However people who have been exposed closely to the secretions of a patient with rabies may be offered PEP as a precautionary measure.

15. What is the purpose of Pre Exposure Prophylaxis (PrEP)? Who should take PrEP?

Ans: Purpose of PrEP is to pre-immunize the persons who are at high risk of getting infection so that they can get protection against rabies exposure.

High risk group includes: Veterinarians, Laboratory staff handling the virus and infected materials, Clinicians and persons attending to human rabies cases , Animal handlers and catchers, wildlife workers ,Quarantine officers and Travelers from rabies free areas to rabies endemic areas.

16. **Co administration of other Vaccines with Rabies vaccine?**

Ans: Evidence supports safe co-administration of rabies vaccines with other inactivated vaccines, such as diphtheria–tetanus–pertussis, inactivated Japanese encephalitis and poliomyelitis vaccines, and live vaccines such as measles–mumps–rubella vaccine. Separate syringes and different injection sites should be used. If RIG is used, live vaccines should be postponed for 3–4 months. Rabies vaccine can also be given concomitantly with COVID-19 vaccines in adults. Currently, there is insufficient evidence for a recommendation on concomitant administration of COVID-19 vaccines in children and adolescents, however as rabies is fatal it should be administered first if co-administration is not recommended.

NATIONAL RABIES CONTROL PROGRAM

RABIES POST EXPOSURE TREATMENT CARD (To be retained at Anti Rabies Clinic)

Name and address of the health facility

Patient Reg. No

Name Age/ Sex	
Patient Residential Address & Contact No	
Category of Exposure	
I. Touching or feeding of animals Licks on intact skin Contact of intact skin with secretions /excretions of rabid animal/human case	☐
II. Nibbling of uncovered skin Minor scratches or abrasions without bleeding	☐
III. Single or multiple transdermal bites or scratches, licks on broken skin Contamination of mucous membrane with saliva (i.e. licks)	☐
Biting Site: Extremities/ Trunk/ Head-Neck Face/ Back	
Date of Exposure/bite (DD/MM/YYYY) Site of Bite/ Bites Type of animal Dog ☐ Monkey ☐ Cat ☐ Other ☐ Biting animal status Alive ☐ Dead ☐ Unknown ☐ Date treatment started (DD/MM/YYYY)	Past h/o vaccination If Yes Specify whether Partial / complete
Wound management	
Washed immediately with water ( ) Yes ( ) No Antiseptic application ( ) Yes ( ) No	Wound washed at facility ( ) Yes ( ) No ARS Infiltration ( ) Yes ( ) No
Post exposure vaccination record Route of Administration ( ) ID ( )IM	

Period	Date due	Date given	Signature
Day 0			
Day 3			
Day 7			
Day 14 (for IM only)			
Day 28			

Outcome: PEP Complete/ Incomplete

Signature

NATIONAL RABIES CONTROL PROGRAM

RABIES POST EXPOSURE TREATMENT CARD (Patient Copy)

Name and address of the health facility

Patient Reg. No

Name Age/ Sex	
Patient Residential Address & Contact No	
Category of Exposure	
I. Touching or feeding of animals Licks on intact skin Contact of intact skin with secretions /excretions of rabid animal/human case	☐
II. Nibbling of uncovered skin Minor scratches or abrasions without bleeding	☐
III. Single or multiple transdermal bites or scratches, licks on broken skin Contamination of mucous membrane with saliva (i.e. licks)	☐
Biting Site: Extremities/ Trunk/ Head-Neck Face/ Back	
Date of Exposure/bite (DD/MM/YYYY) Site of Bite/ Bites Type of animal Dog ☐ Monkey ☐ Cat ☐ Other ☐ Biting animal status Alive ☐ Dead ☐ Unknown ☐ Date treatment started (DD/MM/YYYY)	Past h/o vaccination If Yes Specify whether Partial / complete
Wound management	
Washed immediately with water ( ) Yes ( ) No Antiseptic application ( ) Yes ( ) No	Wound washed at facility ( ) Yes ( ) No ARS Infiltration ( ) Yes ( ) No
Post exposure vaccination record Route of Administration ( ) ID ( )IM	

Period	Date due	Date given	Signature
Day 0			
Day 3			
Day 7			
Day 14 (for IM only)			
Day 28			

Outcome: PEP Complete/ Incomplete

Signature

Notes:

MANAGEMENT OF OTHER TYPES OF BITE

1. Scorpion Bite:

Scorpions are predatory arachnids of the order Scorpions. They have eight legs, and are easily recognized by a pair of grasping pincers and a narrow, segmented tail, often carried in a characteristic forward curve over the back and always ending with a stinger. Mesobuthus tamulus (**Indian Red Scorpion**) and Palamneus swammer-dami are two scorpion types of medical importance. Scorpions live in warm dry regions throughout India. They inhabit commonly the crevices of dwellings, underground burrows, under logs or debris, paddy husk, sugarcane fields, coconut and banana plantations.

Scorpion venom serves to kill or paralyze prey rapidly. The stings of many species are uncomfortable, but only 25 species have venom that is deadly to humans. Scorpion stings are a public health problem, particularly in the tropical and subtropical regions of the Americas, North Africa, the Middle East and Asia. Annual incidence of 1.5 Million cases of scorpion envenomation with 2600 deaths reported globally. Though incidence of Scorpion bite is more common in adult, case fatality is higher among children.

Scorpion-Sting bite is common in India. Several cases of the same are reported in West Bengal every year. It is painful & can be life-threatening in one third of cases. Young children and older adults are most at risk of serious complications.

Mechanism of Action:

Scorpion venoms are a complex mixture of proteins. The short chain peptides (22 to 47 amino acids) interfere with the function of potassium ion channels while long-chain peptides (59 to 76 amino acid residues) modify the channel gating properties of the sodium channel. Other venoms identified include those that act on the calcium and chloride ion channels, hyaluronidases, lysozymes and phospholipase Many of the toxins act on ion channels that play an important role in maintaining resting membrane potential of excitable cells like neurons and myocytes. They produce persistent depolarization of autonomic nerves with release of neurotransmitters from the adrenal medulla and parasympathetic and sympathetic nerve endings.

Clinical Features:

- Pain, which can be intense [Positive "tap test" (i.e., extreme pain when the sting site is tapped with a finger)] . Pain is present in 95% of cases of scorpion sting.
- Edema and Redness present over 20% of cases.
- Numbness and tingling
- Overstimulation of sympathetic system results in increased release of catecholamines , which results into "autonomic storm". Major manifestations of different systems are-**Cardiovascular system**-Tachycardia, Peripheral vasoconstriction, Hypertension, Diaphoresis. **Metabolic manifestations**-Hyperglycemia, Hyperthermia, **Urogenital system**-Urinary Retention, erection in case of Male, **Respiratory system**- Bronchodilation, Tachypnea**, Neuromuscular System**-Mydriasis, Tremor, Agitation etc.
- Cholinergic symptoms can occur due to overstimulation of parasympathetic nervous system-**Hypersecretion syndrome**- Salivation, sweating, Vomiting.
- Pulmonary Edema may present in 20% patients . Pulmonary edema can precipitate both in early and late stage.

Investigation:

- Total Blood count-Leukocytosis present.
- Cardiac Enzyme (CPK-MB) may be raised.
- Serum Amylase may increase and blood Calcium level may decrease.
- Blood Sugar and Potassium increases , while Sodium decreases.
- Chest Radiograph- features of Pulmonary Edema may be present.
- ECG -Tachycardia, ectopic, ventricular arrythmia
- Echocardiography: Poor global myocardial contractility.

Management:

Scoring system is in place for grading severity of scorpion envenomation based on clinical sign and symptoms. Three grades are generally used, ie, grade I for local events, grade II for mild systemic symptoms, and grade III for life-threatening envenoming. The first group represents about 70% of patients, the second 20%, and the third less than 10%.

Management of Scorpion envenomation

Grade	Symptoms	Treatment
I	Local pain (sometime associated with local paresthesia, erythema, ecchymosis, blisters)	• Local application of Ice Pack • NSAID can be administered for pain management. • Oral Rehydration • Infiltration of lignocaine locally for pain management.
II	**Mild systemic envenoming**: **Grade I + Hyperthermia + Cardiovascular and respiratory /Digestive tract/ Neuromuscular disorders**	• NSAID for Pain management • **Intravenous fluid** for rehydration • **Immunotherapy:** scorpion antivenom is effective if patient is brought in early stage.(within 30 minutes of sting) • **Prazosin** is only pharmacological and physiological antidote available for Scorpion bite. Dose -30µg/kg/Dose. Dose need to be repeated every three hour until signs of clinical improvement.* • Blood pressure need to be closely monitored. Ionotropic support may be required. • Midazolam 0.05–0.2 mg/kg orally or IV (or diazepam 0.5 mg/kg IV or rectally) every 12 hours
III	**Life-threatening envenoming:** **Grade II + multi organ failure** **Cardiovascular symptoms** **Diaphoresis** **Neuromuscular disorders (**Glasgow score ≤6 (in absence of sedation) **Biological disorders [** SaO2 < 90%, increasing biomarkers of cellular necrosis, electrolytic anomalies (decrease of Na+ and Ca++, increase of K+)]	• IV fluid with NS or RL @10 ml/kg/aliquot in bolus upto 4 aliquots. If shock continues -Dobutamine infusion should be started. • Intravenous Nitroglycerin in case of Pulmonary Oedema. • Ventilatory support if necessary. • Transfer to Intensive Care unit as patient may need Ventilatory support, Ionotropic support.

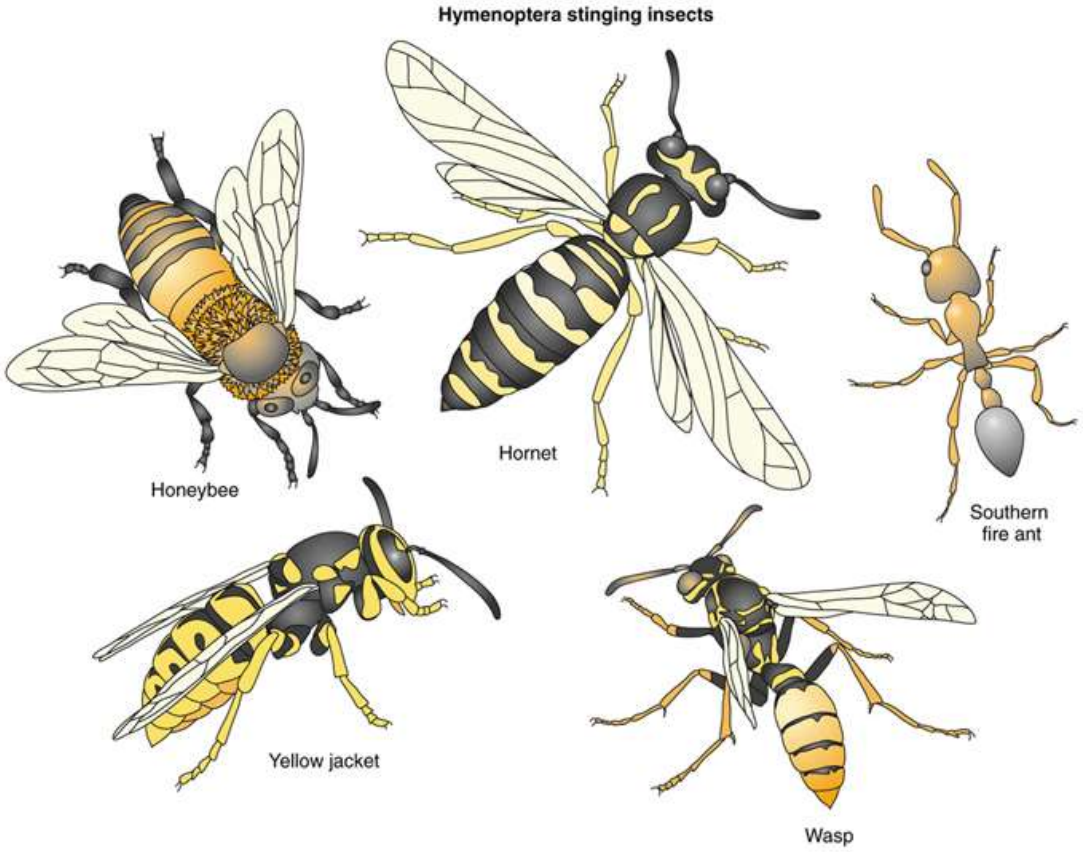
*Prazosin is available as scored 1 mg tablet. **Sustained release tablets are not recommended in this condition.**

Administration of insulin-glucose infusion to scorpion sting victims appears to be the physiological basis for the control of the metabolic response when that has become a determinant to survival. Insulin has a primary metabolic role in preventing and reversing the cardiovascular, haemodynamic, and neurological manifestations and pulmonary oedema induced by scorpion envenoming. The modality of treatment is continuous infusion of regular crystalline insulin at the rate of 0.3 U/g glucose and glucose at the rate of 0.1g/kg body weight/hour, with supplementation of potassium as needed and maintenance of fluid, electrolytes and acid-base balance is required. This treatment should be continued for the next 48-72 hours.

2. HYMENOPTERA STINGS (Bees, Wasps, Hornets & Yellow jackets)

The medically important groups of Hymenoptera are the Apidae (bees), Vespoidea (wasps, hornets, and yellow jackets). These insects deliver their venom by stinging their victims. Bees lose their barbed stinger after stinging and die. Wasps, hornets, and yellow jackets can sting multiple times. Hymenoptera stings may result in immediate hypersensitivity reactions, causing anaphylaxis in nearly 20% cases. Massive envenomation can cause death in nonallergic individuals. The estimated lethal dose is approximately 20 stings/kg in most mammals. However, Anaphylactic reactions to Hymenoptera stings are not dose dependent or related to the number of stings.

Hymenoptera stings can happen in any age group. Humans are most often stung by either accidental contact with a solitary worker (single sting from a single insect) or because they are near a disrupted nest (multiple stings from multiple insects). Occupations that may increase the risk of exposure to these stings include, but are not limited to, construction workers, landscapers, entomologists, beekeepers, exterminators, among others.



Mechanism of Action:

The venom for Apidae (Bees) & Vespidae (wasps, hornets, and yellow jackets) have some similar characteristics, consisting of a mixture of smaller, low-molecular-weight, proteolytic enzymes

(hyaluronidase, proteases, phospholipase, acid phosphatase), lipids, carbohydrates, and also high-molecular-weight proteins. The low-molecular-weight components are responsible for local inflammatory reactions, while the high-molecular-weight component is integral to the systemic reaction (i.e. anaphylaxis).

Clinical Features

Types of Reaction to Sting- Bee, Wasp, Hornet

Type of Reaction	**Manifestation**
Local	It is due to irritative/toxic effects of the venom • Pain, erythema, swelling and itching around the sting site are common • In severe cases of local reaction the swelling and erythema may extend to the entire limb and persist for several days.
Allergic	- IgE-mediated, and reflect previous sensitisation • Usually mild and non-life threatening. Generalised urticaria, pruritus and angio-oedema are typical • **Anaphylaxis:** life threatening, Airway oedema, bronchospasm and vasogenic shock require emergency treatment
Toxic	Direct toxicity from the large amount of venom injected following multiple stings from bees, wasps or ants (usually (> 25). • Airway and circulatory symptoms are unlikely. Gastrointestinal symptoms (vomiting, diarrhoea) predominate. Renal failure due to release of tissue breakdown products may complicate multiple stings (bee or wasp) several days after the event. • Treatment is supportive
Delayed Hypersensitivity	May occur 10-14 days after the sting, with morbiliform rash, uticaria, myalgia, arthralgia and low grade fever

Hymenoptera stings are almost always diagnosed clinically. For this reason, it is very important to get a good history**. The common differential diagnoses are** Anaphylaxis to any allergen, Other insect bites, Cellulitis, Abscess, folliculitis**.**

Management:

- Anaphylaxis is treated with adrenaline (0.3–0.5 mL of a 1:1000 solution, given SC 20–30 min as needed). For profound shock, adrenaline (2–5 mL of a 1:10,000 solution by slow IV push) is indicated. Patients should be observed for 24 h for recurrent anaphylaxis.
- Injectable analgesics and antihistaminic to be used as decided by treating physician
- Stingers embedded in skin should be removed promptly by grasping with forceps or scraping with a blade or fingernail.
- The site should be disinfected; ice packs should be applied to slow the spread of venom.
- Local Reaction:
  - Potent topical glucocorticoid creme or gel, perhaps a moist compress. 20 minutes, possibly repeated once or twice at intervals of a few hours.
  - H1 Blocker (Anti Histaminic)- Cetrizine, Loratidine can be used.
  - In case of large Local Reaction-Oral Prednisolone or its equivalent at 0.5-1 mg/kg body weight with rapid tapering.
- Elevation of the bite site and administration of analgesics, oral antihistamines, and topical calamine lotion may ease symptoms.

3. Spider-Bites

There are around 31 species of spiders found in India. Most of the species of spider found in India are harmless and non-toxic. Poisonous spiders, such as Widow spiders (especially Latrodectus species) are present in temperate and subtropical countries including India. They generally live in undisturbed areas, such as attics or sheds, and don't bite unless threatened. Most of the reports of spider bite and the subsequent effects from India are anecdotal and scientific evidence is very rare. Reports of spider bite from India in medical literature have documented only local reactions like erythema or eschar. Reports from other countries have rarely reported renal failure after spider bite . Most of the cases of acute renal failure have been documented after brown recluse spider bite which has not been found in India.

Mechanism of Action:

The severity of reactions to spider venom depends on factors such as its amount, site of biting and its duration and age and health condition. Mortality due to spider bite is rare . Spider venom includes different peptides and substances affecting sodium, calcium and potassium channels in neurons and also glutamate and acetylcholine receptors.

Clinical features

- Most common symptoms of non-lethal spider-bite include swelling, redness and pain around the bite. It mainly causes local reactions and only rarely, systemic effects are reported
- However, following signs and symptoms have been reported in case of Widow spider bites:
  - Within 60 min, painful cramps spread from the bite site to large muscles of the extremities and trunk.
  - Extreme abdominal muscular rigidity and pain may mimic peritonitis, but the abdomen is nontender.
  - Other features are similar to that of acetylcholine overdose (e.g., excessive salivation, lacrimation, urination, and defecation; GI upset; and emesis).
  - Although pain may subside within the first 12 h, it can recur for weeks.
  - Respiratory arrest, cerebral hemorrhage, or cardiac failure may occur.

Management of Spider Bite:

- Treatment consists of RICE i.e.
  - ✓ R=Rest
  - ✓ I=Icepack
  - ✓ C=Compression
  - ✓ E=Elevation of the affected part
- Tab. Paracetamol quarterly till pain subsides
- Antimicrobials does not have any role in the treatment
- Tetanus prophylaxis for non-lethal and localized symptoms.
- The use of antivenom is limited by questionable efficacy
- Life-threatening Envenoming should be managed in tertiary care preferably in ICU.

Tarantula: Its venom is not dangerous for the human being and merely creates lesions without any specific systemic reaction except for pyrexia. Tarantula's defense mechanism is the hair on its body which stands out and moves when alarmed. If these hairs enter the eye, they can result in the inflammation of all of the layers of the eye. Eye wash and topical corticosteroids are recommended in the case of uveitis. This is the most common spider attack reported in West Bengal.

In the case of bite envenomation, patients will often complain of local symptoms, including pruritus, swelling, and mild to severe pain, lasting for several hours. Sometimes bites can be painless, and sometimes symptoms can be delayed over hours to days. Local tissue reaction may be seen, and depending on the species, local tissue necrosis may develop over hours to days.

In the case of exposure to urticating hairs, the patient will often experience moderate-severe pain, pruritus, and erythema, which can last weeks. However, specific symptoms will depend on the site of exposure. Local symptoms previously mentioned are often associated with cutaneous involvement. Lastly, if there is ocular involvement, patients will often present with a painful, red, conjunctival injection due to corneal or scleral irritation, a reaction termed as ophthalmia nodosa. Later in the disease course, a granulomatous ocular disease may result.

Treatment for tarantula bites or stings from their urticating hairs is mostly conservative and supportive.
Skin: Pain can be treated with ice and analgesics. Itching can be treated with topical steroids, systemic antihistamines, or a combination of the two. Removal of urticating hairs using sticky tape has been reported to reduce pruritus. Multiple applications of the tape can sometimes be necessary. Perform local wound care, and be sure to provide tetanus prophylaxis if necessary. Envenomation should be monitored for signs of secondary infection, but antibiotics are not routinely recommended for tarantula bites or hair exposure.

Ocular: An application of an eye shield can help prevent the patient from inadvertently rubbing the affected eye, which can worsen the damage. Ocular involvement, whether suspected or confirmed by slit lamp, should prompt an ophthalmology consultation as early removal of urticating hairs can reduce long-term complications, including ophthalmia nodosa. The decision for further ophthalmological management should be made in conjunction with a ophthalmologist.

Systemic: In the rare case of anaphylaxis, treat as recommended for anaphylaxis of any etiologies.

4. Lizard Ingestion

Lizards are a type of reptile. There are more than 6000 species of Lizards across the world. Although in many parts of the world it is considered as delicacy, Lizard-ingestion in West Bengal is almost always accidental due to contamination of cooked food . In general ,lizard ingestion does not carry any threat if it is cooked thoroughly. However, it should be kept in mind that lizards carry various disease causing bacteria e.g. *Salmonella,E.coli,Campylobacter and Staph.aureus.*These bacteria can cause food-poisoning.

Clinical Features:

Patient may show the signs of food-poisoning due to bacterial contamination-

- Nausea
- Vomiting
- Diarrhea
- Abdominal Pain
- Fever etc.

The symptoms may occur from 30 mins to several days after consumption

Management:

- Rest and Assurance
- Fluid-resuscitation to maintain Urine-output at least 30ml/kg in 24 hours
    - ✓ ORS (if patient has mild symptoms and can drink)
    - ✓ I.V.Fluid may be required if patient is unable to drink.
- Based on the condition of the patient
    - ✓ Tab./Inj. Ondanstron for nausea and vomiting
    - ✓ Tab.Paracetamol for Fever
- Antimicrobial (Tab. Or I.V. Norfloxacin) and Probiotics to treat diarrhoea.

Lizard droppings are dangerous. Lizard droppings are easy to identify because they have white tips and rest black or blackish brown.. This is due to lizards' waste elimination process, in which solid and liquid waste is expelled through the same opening. The white tips are crystallized uric acid. Feces size varies in

relation to the size of the lizard. Dangerous Salmonella bacteria is found in lizard droppings. It can be transmitted to humans if waste enters the mouth.

5. Mongoose-Bite

A mongoose is a small terrestrial carnivorous mammal belonging to the family Herpestidae Mongooses are long, furry creatures with a pointed face and a bushy tail. Despite popular belief, mongooses are not rodents. Bites by mongoose are uncommon. Mongoose have needle-like incisors and carnassial teeth with the largest being canines that typically cause puncture wounds.

Most of the cases with history of mongoose bite has resulted fatality due to rabies encephalitis. Mongoose bite causes deep and narrow wound to the victim , hence wound surface is difficult to clean. Common microorganism present in oral flora are - Pasteurella multocida, Staphylococcus aureus, Pseudomonas and Streptococcus, hence it can lead to infection and ultimately sepsis.

Management:

Wound Management:

- Immediate wash with soap in running water to dislodge any virus attached.
- Application of Povidone iodine if available.
- Broad spectrum antibiotic needs to be given.
- If wound is infected early surgical debridement is necessary.

Post Exposure Prophylaxis:

- Post Exposure Prophylaxis -Category III Bite with co administration of Rabies Immunoglobulin on urgent basis.
- Tetanus toxoid and Immunoglobulin if necessary.

6. Tiger Bite:

Tiger bite is not uncommon among fishermen , woodcutters and people who collect honey from deep forest specially in Sundarban delta region in West Bengal. People who suffered Tiger bite have extensive lacerated wound involving soft tissue and musculoskeletal system. As well as lot of micro organism are present in oral cavity can leads to infection.

Management:

- Resuscitate the tiger bite victim, ensure Airway, Breathing, Circulation .
- Intravenous fluid to prevent circulatory collapse. Blood transfusion if required.
- Surgical Intervention-Wound Debridement, Wound toilet , Limb salvaging surgery.
- Orthopedic intervention if necessary.
- Injection Tetanus Toxoid and Immunoglobulin based on previous immunization status.
- Post Exposure Prophylaxis for animal Bite (Category III) along with Rabies Immunoglobulin.
- Higher antibiotic coverage is necessary.

7. Crocodile Bite:

- Crocodile bite is common among fishermen who used to do fishing activity in riverine belt. Crocodile bite causes soft tissue and musculoskeletal injury along with unusual oral flora present in crocodile bite triggers infection. They exert the most powerful bite of any creature, and once the mouth is closed it is kept closed easily because the mouth-opening muscles are very weak. Crocodilians- alligators, crocodiles, caimans, and their kin- kill hundreds of people each year.
- Microorganism isolated in case of Crocodile bite are: Vibrio vulnificus, Burkholderia Pseudomallei, Pantoea agglomerans, Bacteroides melaninogenicus , Aeromonas hydrophila etc. Infections are usually polymicrobial, bacteria may be difficult to culture and there may be resistance to common antibiotics.

Management:

- Resuscitate the bite victim, ensure Airway, Breathing, Circulation .
- Intravenous fluid to prevent circulatory collapse. Blood transfusion if required.
- Surgical Intervention-Wound Debridement, Wound toilet, Wound suture, Limb salvaging surgery.
- Orthopedic intervention if necessary.
- Injection Tetanus Toxoid and Immunoglobulin based on previous immunization status.
- Use of broad-spectrum antibiotics.

8. Paederus beetles (Nairobi fly):

Paederus beetles causing dermatitis linearis have a variety of local names, including Nairobi fly.

This is a specific form of irritant dermatitis often characterized by linear lesions on the exposed areas of the body, mainly on the neck and face, generally appearing during the night . This irritation is not caused by a bite or sting, but rather by accidental brushing or crushing of a Paederus beetle over an exposed area of the human body . Due to crushing, these beetles excrete a toxic substance in their hemolymph, which contains a vesicant called pederin that is more potent than cobra venom.

Because of these burns, the Nairobi fly is sometimes referred to as a "dragon bug." Adult beetles are predominantly black and red in colour, and measure 6–10 mm in length and 0.5-1.0 mm in width. Their head, lower abdomen, and elytra are black, with the thorax and upper abdomen red. Adults are attracted to incandescent and fluorescent lights, and as a result, inadvertently come into contact with humans. Heavy rains, sometimes provide the conditions for the Nairobi fly to thrive.

Preventive Measures:

1. The main preventative measures to reduce contact with Paederus rove beetles include the use of bed nets, long-sleeve clothing and avoiding sitting under lights at night.
2. If a beetle does land on your skin it should be blown or gently brushed off and not crushed. Or, hold a piece of paper in front of the insect, let it crawl on to it, then throw away.
3. The contact area of the skin should be promptly washed with soap and water.

Recommended treatment: As the exposure is chemical in nature and symptoms typically resolve over time, treatment is traditionally considered palliative. If noticed immediately (minutes after crushing), individuals should generously flush the exposed area with soap and water.

Wet compresses or lint may be applied to the area in aim of diluting the concentration of the toxin, in addition to providing pain relief for burning and itching. Several studies have shown that topical corticosteroids are effective in alleviating symptoms and swelling.

Intravenous administration of steroids is generally reserved for extreme cases, such as systemic exposure or exposure to very sensitive regions such as the genitals.

Artificial eye drops including Moisol drops, homatropine and ciprofloxacin/dexamethasone solutions are prescribed for cases involving the eye.

In addition to topical remedies, antihistamines are commonly administered to reduce the inflammatory response to pederin. In cases including symptoms of headache, fever and nausea, non-steroidal anti-inflammatory medications and analgesics are suggested for general pain relief. Excessive itching or scratching of lesions may result in open wounds; therefore in severe cases antibiotics may be prescribed prophylactically to reduce the risk of secondary infection of dermal abrasions. With appropriate treatment, lesions usually resolve in a few days to a week, depending on severity.

Advice to be given for common people regarding initial management of Poisonous Insect Bite:

- Do not panic. In most cases, some general measures cure the patient.
- Apply lime at the site of sting. it may help since lime is alkaline.
- Apply ice at and around site of sting.
- By putting uniform pressure from all sides at site of bite (with a hollow key or else) , try to take the sting out without damaging surrounding tissue.
- In case of contact with Nairobi fly, immediately wash the skin with soap and water.
- Visit to nearest health facility immediately.

Notes