सत्यमेव जयते

TRAINING MODULE FOR MEDICAL OFFICERS

NATIONAL RABIES CONTROL PROGRAMME

National Center for Disease Control
Directorate General of Health Services
Ministry of Health and Family Welfare
Government of India

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ABBREVIATIONS

ABC-AR	Animal Birth Control- Anti Rabies
AEFI	Adverse Event Following Immunization
AIDS	Acquired Immunodeficiency Syndrome
ARC	Anti-Rabies Clinic
ARV	Anti-Rabies Vaccine
CCV	Cell Culture Vaccine
CD4	Cluster of differentiation 4
CHO	Chinese Hamster Ovarian
CNS	Central Nervous System
CSF	Cerebrospinal Fluid
DCGI	Drug Controller General of India
DNA	Deoxyribonucleic Acid
DRIT	Direct Rapid Immunohistochemical test
ELISA	Enzyme-linked Immunosorbent Assay
ERIG	Equine rabies immunoglobulins
FAO	Food & Agricultural Organization
FAT	Fluorescent Antibody Test
GARC	Global Alliance for Rabies Control
HDCV	Human Diploid Cell Vaccine
HIV	Human Immunodeficiency Virus
HRIG	Human Rabies Immunoglobulins
ID	Intradermal
IDRV	Intradermal Rabies Vaccination
IM	Intramuscular
IU	International Units
MoHFW	Ministry of Health & Family Welfare
NCDC	National Centre for Disease Control
NIMHANS	National Institute of Mental Health & Neurosciences
nm	Nanometre
mL	Millilitre
NRCP	National Rabies Control Programme
OIE	Office International des Epizooties

PCECV	Purified Chick Embryo Cell Vaccine
PCR	Polymerase Chain Reaction
PDEV	Purified Duck Embryo Vaccine
PEP	Post Exposure Prophylaxis
PrEP	Pre-Exposure Prophylaxis
PVRV	Purified Vero cell Rabies Vaccine
RFFIT	Rapid Fluorescent Focus Inhibition Test
RIG	Rabies Immunoglobulin
RmAb	Rabies monoclonal Antibodies
RNA	Ribonucleic Acid
SST	Skin Sensitivity Test
TRC	Thai Red Cross
TT	Tetanus Toxoid
UIP	Universal Immunization Programme
WHO	World Health Organization

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आज़ादी का अमृत महोत्सव

भारत सरकार
स्वास्थ्य एवं परिवार कल्याण विभाग
स्वास्थ्य एवं परिवार कल्याण मंत्रालय
Government of India
Department of Health and Family Welfare
Ministry of Health and Family Welfare

Foreword

Rabies is one of the most important Zoonotic disease affecting both animals and Humans. Human rabies can be prevented through prompt administration of Post-Exposure Prophylands (PEP) to victims of rabid animal bites and infection can be eliminated at source through sustained mass vaccination of dog population. As part of the global effort to eliminate the disease by 2030, India is also actively implementing various strategies to control and eliminate dog mediated rabies in the country through a graded approach.

National Disease Control Center's efforts to eliminate rabies related mortality and mobility is commendable. To achieve this, it is important to upgrade the skill of medical professionals engaged in this programme.

National Centre for Disease Control (NCDC) has developed training module for health care professionals especially medical officers, programme managers, resident doctors/ interns and health care workers about key activities for Rabies prevention and control i.e Post and pre-Exposure Prophylaxis, Surveillance, sampling techniques, lab. diagnosis, counselling & risk communication, logistic management etc.

This document will provide Medical officers all necessary guidance for prevention & Control of Human Rabies and will serve as a useful reference for all those striving to eliminate rabies.

(Rajesh Bhushan)

Date : 29th May, 2023
Place : New Delhi

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PREFACE

Rabies is a 100% preventable zoonotic disease that continues to be a threat to human civilization worldwide dog bites are the primary source of human rabies, accounting for up to 96% of all cases. In line with global efforts to eliminate dog-mediated rabies by 2030, the National Centre for Disease Control, Delhi, jointly launched a "National Action Plan for Dog Mediated Rabies Elimination from India by 2030" under the aegis of Ministry of Health and Family Welfare, Government of India. This plan provides a broad framework for combating rabies and aims at systematic reduction of rabies risk through a variety of measures. Adequate and appropriate training of healthcare professionals is an important part of this plan and crucial to prevent deaths due to rabies.

It is heartening to note that the programme division has developed a training module for medical officers on animal bite management, rabies post-exposure prophylaxis, diagnosis, counselling, and risk assessment. This document will help streamline case management of animal bites and help prevent rabies in all parts of the country in accordance with national guidelines.

I extend my congratulations to my colleagues of NCDC, looking after the National Rabies Control Programme for developing this detailed training module. I am confident that medical professionals across India will find this document helpful in providing appropriate animal bite management, effective administration of anti-rabies prophylaxis thereby reducing risk of rabies.

(Atul Goel)

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आज़ादी का अमृत महोत्सव

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Foreword

Rabies is a vaccine-preventable disease in both humans and animals. Following the theme of World Rabies Day 2022, "One Health, Zero Deaths", Ministry of Health & Family Welfare working on debugging the myths related to Rabies, the importance of dog vaccination and post-exposure prophylaxis, and the need for a united effort toward achieving the elimination of this transboundary disease.

The COVID-19 pandemic has shown the stark vulnerabilities of health systems but it also demonstrated what collaboration across sectors can achieve. Rabies control programmes offer a great example for One Health implementation and are crucial for other zoonotic diseases, including those that are pandemic-prone.

Imperfect awareness compounded by variable accessibility of PEP has resulted in the persistence of human rabies fatalities. For prevention, control and elimination of Rabies an effective and concerted efforts from Animal Husbandry / health Department, Local self-governing bodies, Private medical /veterinary organization, universities and other stakeholders, is the need of the hour.

I hope this publication will help the public healthcare professionals to understand all technical aspects of the disease as well as strategic interventions required for rabies prevention and to ensure that the community is effectively protected from this disease.

(Lav Agarwal)

Date : 5th July, 2023

Place : New Delhi

MESSAGE FROM THE DESK OF PROGRAMME OFFICER

Rabies is present in more than 150 countries and on all continents, except Antarctica. The infection claims lives of 55,000 people each year, mainly in Asia and Africa and causes and estimated cost of US$ 8.6 billion every year to world economy. In India, rabies is a major public health problem with an estimated 18000-20000 death every year. About 30-60% of reported rabies cases and deaths in India are in children under 15 years and most of them go unreported.

Globally many countries have achieved rabies elimination and the World Health Organization (WHO) has called for zero human deaths from dog-mediated rabies by 2030. To achieve the target, Ministry of Health and Family Welfare (MoHFW), Government of India launched the "National Rabies Control Programme (NRCP)" during the 12th five-year plan. The objective is to prevent human deaths from rabies using one health approach. Accordingly, to address the issue, in September 2021, "National action plan for dog mediated rabies elimination from India by 2030" was released which was prepared in consultation with Department of Animal Husbandry and Dairying and other key stakeholders like WHO, WOAH, NITI Aayog, ICMR, ICAR, National Human Rights Commission, Animal Welfare Board of India, Academicians and other relevant stakeholders.

Rabies is 100% preventable through prompt and appropriate medical care. One of the key activities envisaged under the programme are training of health professionals on appropriate animal bite case management and rabies PEP. So a detailed training module has been prepared for medical officers under the programme to guide them on proper animal bite case management, PrEP and PEP, recording, reporting and surveillance of rabies cases and other key aspects like rabies in animals and how intersectoral coordination play a major role in eliminating rabies.

The NRCP programme urges all the medical officers and other healthcare professionals to go through the latest guidelines on rabies case management and surveillance provided in the training module and help the country achieve "Zero by 30" goal i.e., Zero deaths due to Human Rabies.

I sincerely hope that this training module will serve as a useful technical document for training the healthcare professionals in undertaking appropriate animal bite management and will bring out uniformity in practicing post-exposure prophylaxis in the country.

Dr. Simmi Tiwari
Joint Director and Head
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Session No.	Topic	Duration
Session -1	Epidemiology and Pathogenesis	45 Minutes
Session -2	Animal Bite Management, PEP, PrEP	90 Minutes
Session -3	Diagnosis And Case Management	60 Minutes
Session -4	Recording, Reporting And Surveillance	60 Minutes
Session -5	Logistics For Rabies Biologicals	30 Minutes
Session -6	Health Facilities as Anti-Rabies Clinic	45 Minutes
Session -7	Risk Communication	30 Minutes
Session -8	Rabies In Animals	30 Minutes
Session -9	Understanding One Health For Rabies	30 Minutes
Frequently asked questions (FAQs)		

SESSION 1 - EPIDEMIOLOGY AND PATHOGENESIS

Learning objectives

- To provide brief information about the National Rabies Control Program.
- To provide a brief introduction on Epidemiology of Human Rabies, Disease burden of Human Rabies (Global & National) and its pathogenesis.
- To describe the major clinical features of Rabies

1.1 INTRODUCTION- NATIONAL RABIES CONTROL PROGRAMME (NRCP)

Rabies is an acute viral disease that causes fatal encephalomyelitis in virtually all warm-blooded animals including humans. The virus is found in wild and some domestic animals and is transmitted to other animals and humans through their saliva (following bites, scratches, licks on broken skin and mucous membrane). In India, the disease is mainly transmitted by the bite of a rabid dog (dogs are responsible for about 97% of human rabies cases), followed by cats (2%), jackals, mongooses, and others (1%).

Rabies has terrified man since antiquity. The fear is by no means unfounded since the disease is invariably fatal and perhaps the most painful and dreadful of all communicable diseases. Fortunately, the development of rabies can be prevented to a large extent if animal bites are managed appropriately and in time.

National Rabies Control Programme (NRCP) is being implemented in the country since the 12 Five Year Plan with an objective to prevent deaths due to rabies in humans. National Centre for Disease Control is the nodal centre for implementation of the programme. The key strategies of the programme are:

- Provision of Rabies Post Exposure Prophylaxis
- Strengthening surveillance of animal bites and human rabies
- Capacity building of health care professionals for appropriate management of Animal Bite Victims
- Strengthening laboratory diagnosis of Rabies
- Increase awareness about Rabies in the general community
- Strengthening Inter-Sectoral Collaboration with other Sectors

1.2 RABIES EPIDEMIOLOGY

Rabies is present on all continents, except Antarctica, with over 95% of human deaths occurring in the Asia and Africa regions.

Rabies is one of the neglected tropical diseases that predominantly affect poor and vulnerable populations who live in remote rural locations. Although effective human vaccines and immunoglobulins exist for rabies, they are not readily available or accessible to those in need. V fc Globally, rabies deaths are rarely reported and children between the ages of 5–14 years are frequent victims. Treating a rabies exposure, where the average cost of rabies post-exposure prophylaxis (PEP) is US$ 40 in Africa, and US$ 49 in Asia, can be a catastrophic financial burden on affected families.

1.3 GLOBAL BURDEN

The number of human deaths globally due to dog-mediated rabies is estimated to be 59 000 annually, with an associated loss of 3.7 million DALYs. Majority of deaths are estimated to occur in Asia (59.6%) and Africa (36.4%), and most DALYs are due to premature death (> 99%) and a few adverse events after administration of nerve tissue vaccines (0.8%). The overall economic cost of dog-mediated rabies was estimated in a probability decision-tree model to be US$ 8.6 billion (95% confidence interval, 2.9–21.5billion) not including psychological trauma for victims and communities.

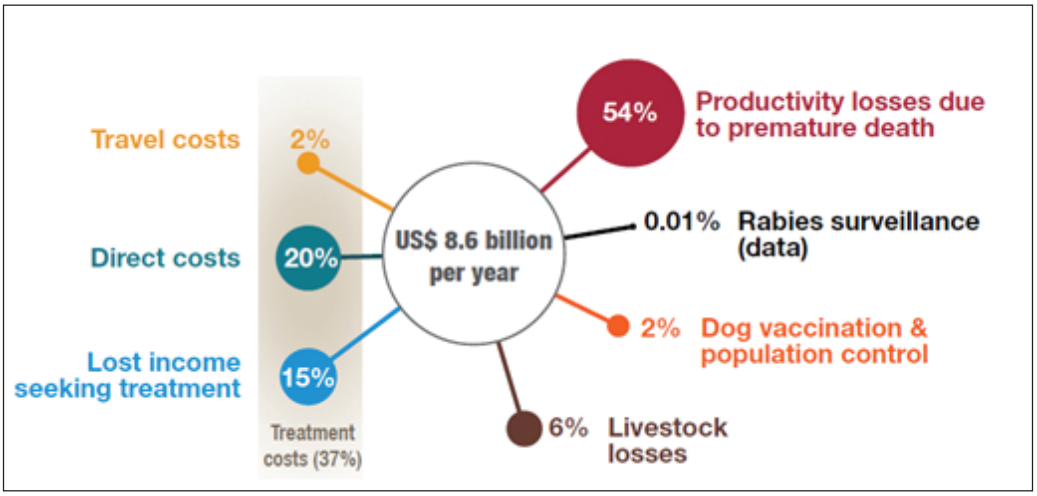
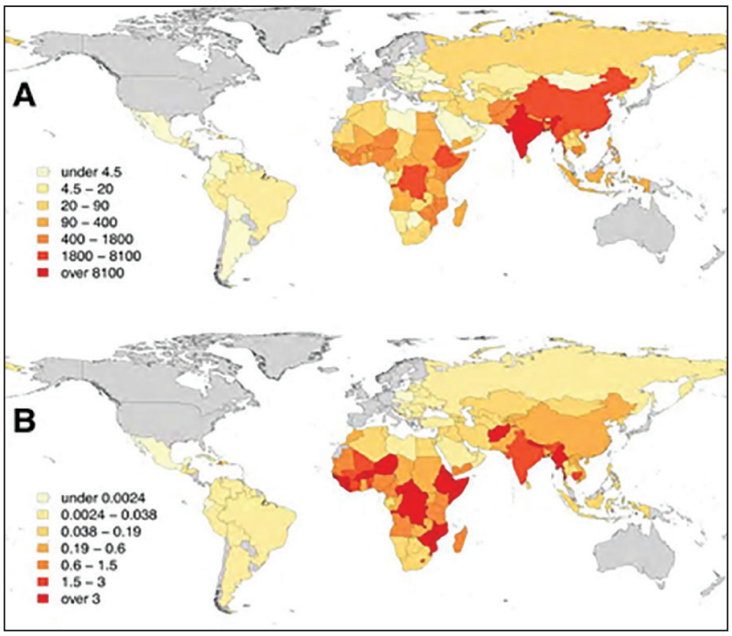


Figure 1 – Breakdown of the economic burden of rabies as Zero by 30: the global strategic plan to end human deaths from dog-mediated rabies by 2030. https://apps.who.int/iris/handle/10665/272756

1.4 BURDEN IN ASIA

An estimated 35 172 human deaths (59.6% of global deaths) and loss of approximately 2.2 million DALYs occur per year in Asia due to dog-mediated rabies. The cost of PEP is highest in Asia, with estimates up to US$ 1.5 billion per year. Despite widespread underreporting and uncertain estimates, rabies is a major burden in Asia, particularly for the rural poor.



General Aspects & Laboratory Diagnostic Techniques, NCDC-WHO, 2007

Figure 2: Global burden of Rabies. A: Human deaths from rabies; B: Death rates per capita (per 100 000 population); countries shaded in grey are free from canine rabies

1.5 BURDEN IN INDIA

For India, it is estimated that per year 20,000 human deaths are caused by rabies and 17.4 million animal bites occur per year. Dog mediated rabies is a major public health problem accounting for about 96% of the human deaths by rabies. An enhanced verbal autopsy survey within the Million Deaths Study suggested that 12700 deaths (95% confidence interval, 10 000–15 500) were due to furious rabies in India. India accounts for the most deaths in Asia (59.9% of human rabies deaths) and globally (35% of human rabies deaths). Rabies is endemic in India except for Andaman & Nicobar and Lakshadweep Islands. (2: Suraweera W et. al.; Million Death Study Collaborators. Deaths from symptomatically identifiable furious rabies in India: a nationally representative mortality survey. PLoS Negl Trop Dis. 2012;6(10):e1847. doi: 10.1371/journal.pntd.0001847. Epub 2012 Oct 4. PMID: 23056661; PMCID: PMC3464588.)

In India, rabies is transmitted most commonly by dogs and cats (~97%), followed by wild animals (2%) such as mongoose, foxes, jackals, and wild dogs, and occasionally by horses, donkeys, monkeys, cows, goats, sheep, and pigs. Rodents, rats and bandicoots, squirrels, rabbits etc. birds and bats are generally not known to transmit rabies in India. In the past seven years, there has been an increasing trend of animal bites reported to IDSP. 21.80 lakhs animal bites were reported in 2012 to IDSP-IHIP.

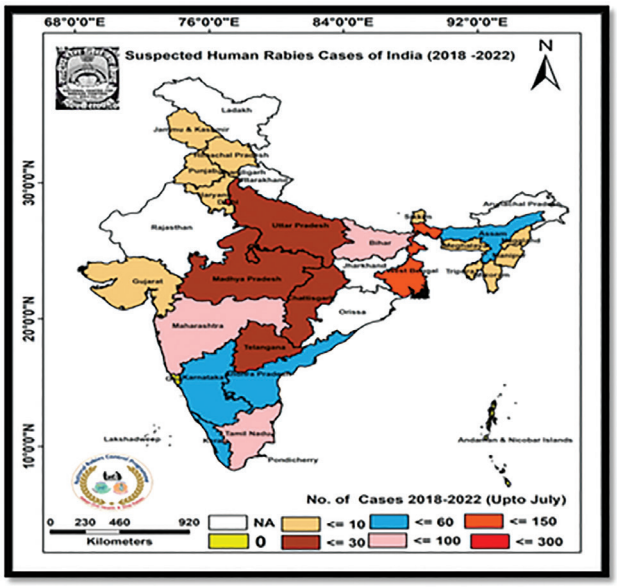


Figure 3: State wise Reported Human Rabies Cases 2018 to 2022

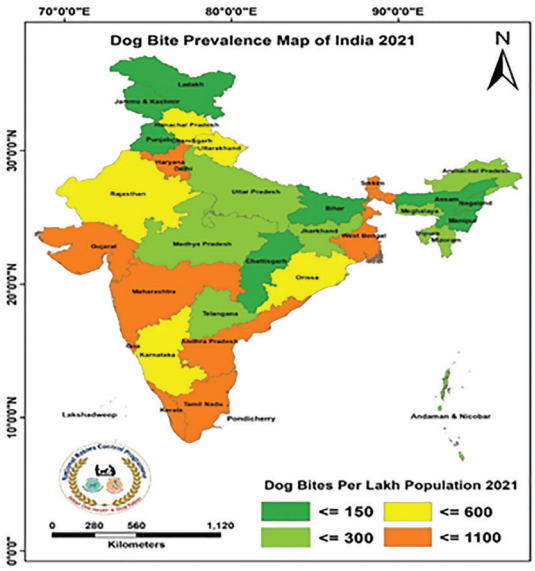


Figure 4: State wise Animal Bite prevalence Year 2021

1.6 RABIES VIRUS

Lyssaviruses are negative-sense, single-stranded, enveloped, bullet-shaped RNA viruses. They are composed of two structural and functional units:

(i) The outer envelope covered with spike-like projections (10 nm in length) corresponding to G-protein trimers which recognize specific viral receptors on susceptible cell membranes; hence pathogenicity of lyssavirus is attributed to protein G.

(ii) The internal helically packaged ribonucleocapsid, which is composed of the genomic RNA intimately associalted with protein N, polymerase L and its cofactor protein P (formerly named M1). The ribonucleocapsid complex ensures genome transcription and replication in the cytoplasm. Finally, protein M (formerly named M2) occupies an intermediate position between the ribonucleocapsid and the envelope and is responsible for virus budding and the bullet-shaped morphology.

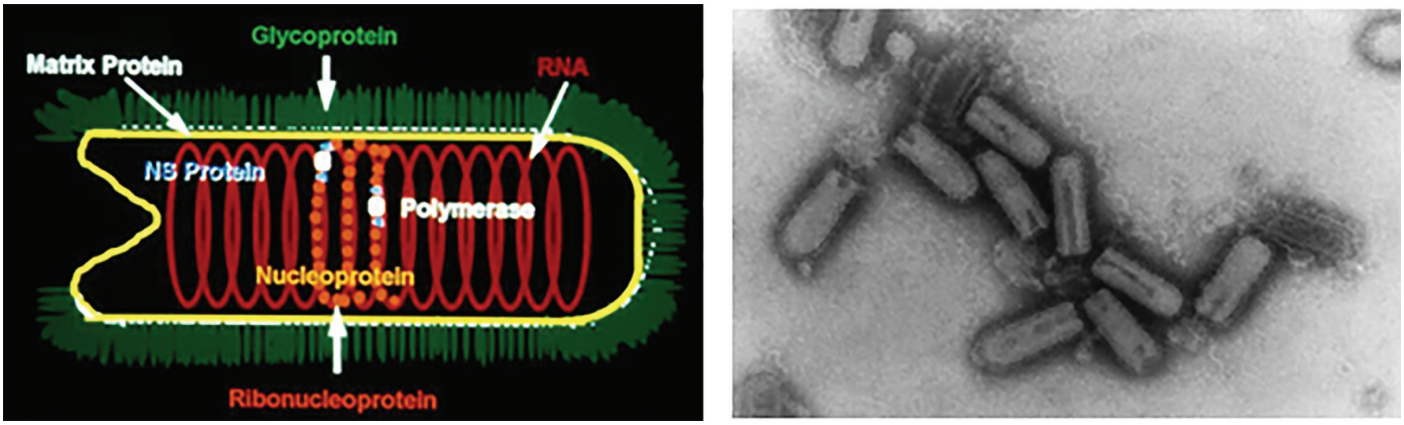


Figure 5: Rabies virus

1.7 MODE OF TRANSMISSION

RABV enters the body through open skin (scratches, bites or other open wounds) or by direct contact with mucosal surfaces; it cannot cross intact skin. RABV may replicate in muscle or other local tissues after exposure and gain access to motor endplates and motor axons to reach the central nervous system. Virions are carried in transport vesicles to the central nervous system exclusively by fast retrograde transport along motor axons, with no uptake by sensory or sympathetic endings (Viruses can also enter motor axons in peripheral nerves directly during a penetrating injury).

Table 1- Animals transmitting rabies in India

Frequent	Occasionally		Not reported
Dogs & cats	Monkeys	Bears	Bats *
	Mongoose, shrew	Pigs	Rodents *
	Cows & buffaloes	Donkeys	Birds
	Foxes, wolves & jackals	Horses	Squirrel
	Sheep & goats	Camels	
Note: All exposures with wild animals are considered Category III exposures. * Bite by bats or rodents do not ordinarily necessitate rabies vaccination in India. However, bites by bats or rodents in unusual circumstances may be considered for vaccination in consultation with an expert in the field of rabies.			

1.8 PATHOGENESIS

On entering into the human body through wounds or direct contact with mucosal surfaces, the rabies virus either multiplies at the local site of inoculation in non-nervous tissues or directly enters peripheral nerves and travels by retrograde axoplasmic flow to the central nervous system before its spread towards the brain via the nerves. It does not follow the hematogenous route of spread.

The movement of the virus is extremely slow (5–100 mm per day) which results in a long incubation period. Factors that may influence the length of the incubation period include the site of the bite, the amount of virus in the saliva of the biting animal, the virus strain, and the age and immune status of the victim. It is shorter in case the bite is closer to the brain and a massive dose of the virus has been inoculated.

Human rabies can manifest as a spectrum of disease, from furious to paralytic manifestations, which

cannot be correlated with a specific anatomical localization of RABV in the central nervous system.

The virus then moves from CNS via anterograde axoplasmic flow within peripheral nerves and reaches salivary glands and other organs. The virus is widely disseminated throughout the body at the time of clinical onset. This has practical implications as organ transplantation has resulted in the transmission of the disease to the recipient.

The incubation period of the majority of cases is 2–3 months, while 2–3% of cases have had an incubation period > 1 year, with an exceptional case of 8 years. **Because of the wide range of incubation periods, post-exposure prophylaxis should be given as soon as possible, however, it should not be denied to persons reporting late.**

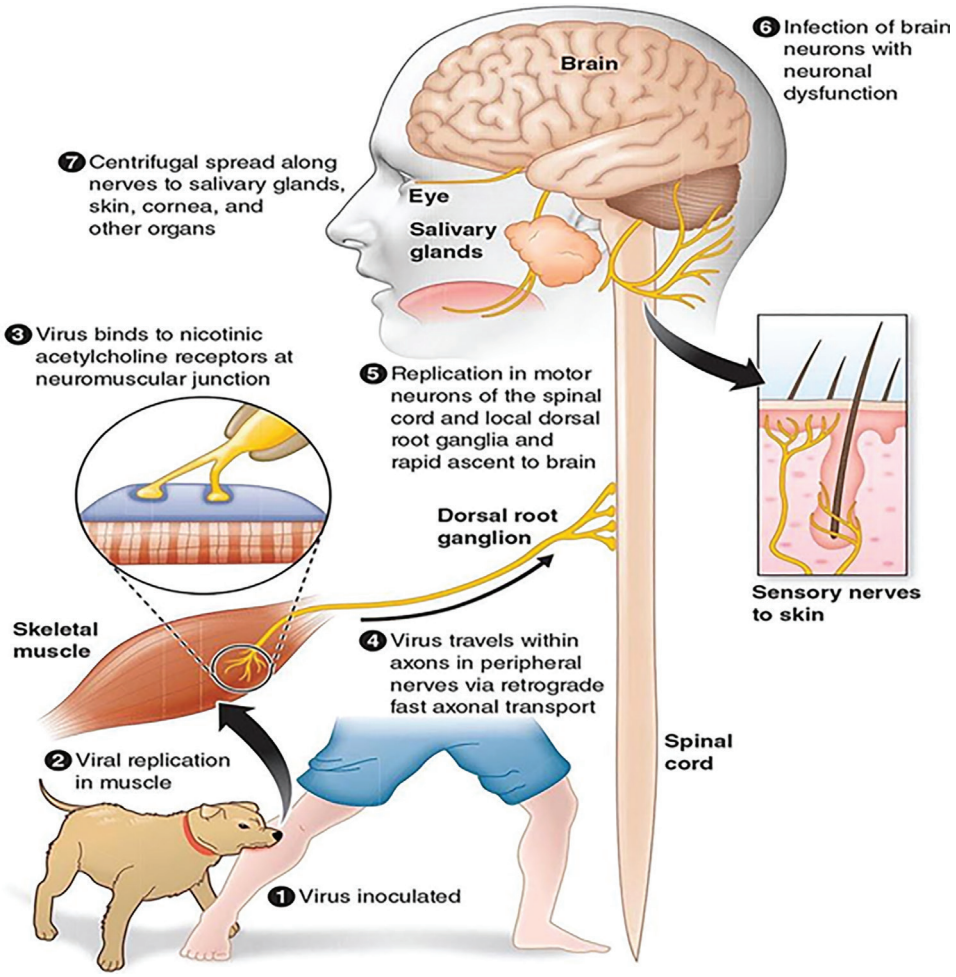


Figure 6: Schematic representation of the pathogenetic events following peripheral inoculation of rabies virus by an animal bite. (Adapted from Jackson AC: Human disease, in Rabies: scientific basis of the disease and its management, 3rd ed., AC Jackson [ed], Oxford, UK, Elsevier Academic Press, 2013, pp 269–298; with permission.)

1.9 CLINICAL SIGNS AND SYMPTOMS

Human rabies can manifest in various different ways, from furious to paralytic manifestations, which cannot be correlated with a specific anatomical localization of RABV in the central nervous system. Rabies usually presents as atypical encephalitis with preservation of consciousness; the disease may be difficult to recognize after the onset of a coma.

Standard case definitions for suspected, probable and confirmed cases can be found in Session 4 - Recording, reporting and surveillance.

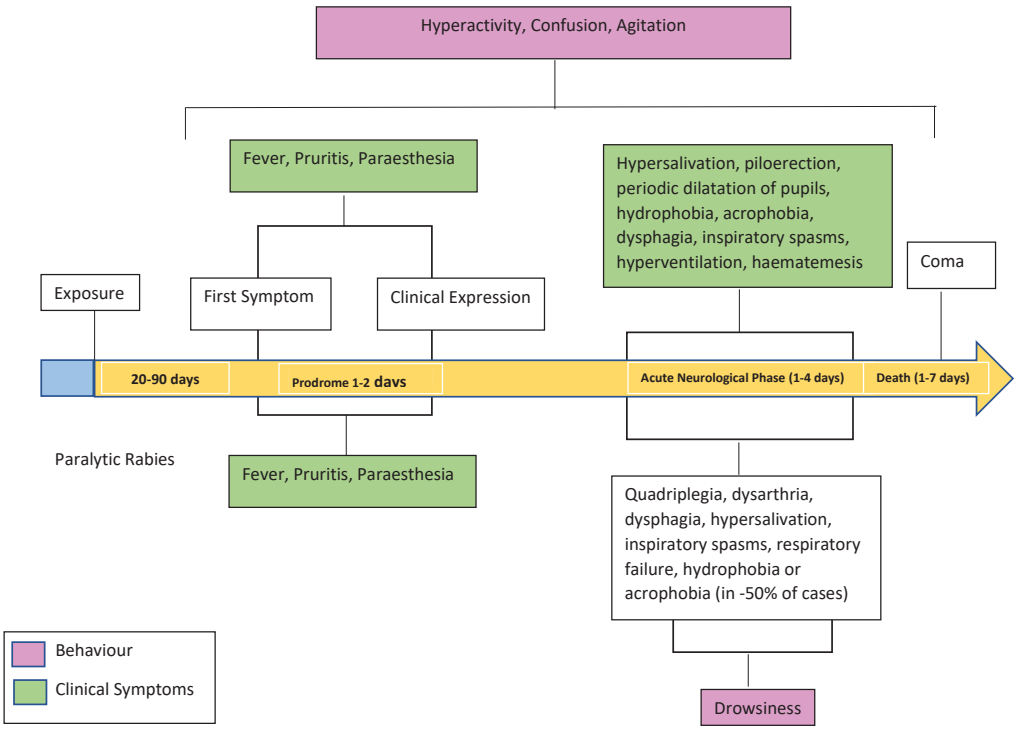


Figure 7: Two types of presentation of the Acute Neurologic stage of rabies in humans (Source: Gaillard F, Baba Y, Sharma R, et al. Rabies encephalitis. Reference article, Radiopaedia.org)

Before CNS manifestations, dorsal root ganglionitis can result in localized neuropathic pain in the region of exposure (bite) 3.

Involvement of the CNS by rabies can take two forms, which do not appear to correlate with the site of the bite, previous immunization, vector (bat, dog or other) or any other clinical feature 1-3:

1. classic rabies encephalitis (80%); equivalent to 'furious rabies' in dogs
2. paralytic rabies (20%); equivalent to 'dumb rabies' in dogs

Classic rabies encephalitis: Encephalitis is by far the most common presentation of CNS involvement by rabies, accounting for 80% of cases. Symptoms are initially non-specific with general systemic symptoms, anorexia, irritability, inspiratory spasms and cough, autonomic dysfunction and altered mental status. With time classic symptoms and rabies encephalitis develop including hydrophobia, aerophobia and hypersalivation, agitation and even priapism.

Paralytic rabies: Paralytic rabies is relatively uncommon accounting only for 20% of CNS infections in humans. It is characterized by bilateral global motor weakness resulting in bilateral facial weakness and quadriparesis, with relative sparing of the sensory system 1,3. It clinically resembles Guillain-Barré syndrome

Pathology: Once introduced into the soft tissues, the virus enters unmyelinated nerve fibres and travels retrogradely up the axons to the dorsal root ganglia, which can result in neuropathic pain 3. Once it reaches the central nervous system dissemination is rapid accounting for the fulminant clinical course 2,3.

Radiographic features : As is the case with other encephalitis, MRI is the only modality of any use in the diagnosis of CNS rabies, as CT is usually normal. Unfortunately, the very rapid progression of symptoms in this disease results in infrequent imaging, and a relative lack of literature on the imaging findings .

MRI : Magnetic resonance imaging, performed with adequate precautions for potentially infectious patients, can be helpful . Abnormal, ill-defined, mildly hypersignal T2 images involving the brain-stem, hippocampus, hypothalamus, deep and subcortical white matter and deep and cortical grey matter are

evident, regardless of clinical type. Gadolinium enhancement may appear clearly only in later stages when patients lapse into a coma. Such patterns can help differentiate rabies from other viral encephalitis, not in terms of location, but in the appearance of the T2 image and in the pattern of contrast enhancement, when compared with consciousness status. Computerized tomography of the brain is of little diagnostic value.

Angiography: Reports of narrowing of terminal internal carotid arteries and distal basilar artery may be related to arterial spasm .

Differential Diagnosis: Rabies should be included in the differential diagnosis of all patients who present with unexplained, acute, progressive viral encephalitis, even in areas where the disease is rare, as it can occur locally in wildlife (e.g. jackal, fox, mongoose).

The diagnosis of rabies may be difficult without a reliable history of animal exposure. Careful elicitation of animal bite exposure is required in cases of substance abuse. The presentation of rabies is usually quite different from that of acute viral encephalitis due to most other causes, including herpes simplex encephalitis and arboviral (e.g., West Nile) encephalitis. Early neurologic symptoms may occur at the site of the bite, and there may be early features of brainstem involvement with the preservation of consciousness. Anti–N-methyl-d-aspartate receptor (anti-NMDA) encephalitis occurs in young patients (especially females) and is characterized by behavioural changes, autonomic instability, hypoventilation, and seizures. Many other antibodies are associated with autoimmune encephalitis. Post-infectious (immune-mediated) encephalomyelitis may follow influenza, measles, mumps, and other infections; it may also occur as a sequela of immunization with rabies vaccines derived from neural tissues, which are used only in resource-limited and resource-poor countries.

Differential Diagnosis for Human Rabies

- Guillain-Barré syndrome
- Viral encephalitis
- Poliomyelitis
- Transverse myelitis
- Cerebrovascular accident
- Psychosis
- Intracranial mass
- Epilepsy
- Atropine poisoning
- Creutzfeldt-Jacob disease

POINTS TO REMEMBER

1. Rabies is an acute viral disease that causes fatal encephalomyelitis in virtually all warm-blooded animals including man.
2. The number of human deaths globally due to dog-mediated rabies is estimated to be 59,000 annually.
3. The majority of deaths are estimated to occur in Asia (59.6%) and Africa (36.4%).
4. As per estimates, India has the highest burden of Human Rabies Cases. It is estimated that the annual incidence of Human Rabies Deaths is 20,000.
5. Rabies virus enters into the human body through inoculation of infectious saliva into wounds, scratches or direct contact with mucosal surfaces from where it spreads to the central nervous system towards the brain.
6. The incubation period of the majority of cases is 2–3 months, while 2–3% of cases have had an incubation period > 1 year, with an exceptional case of 8 years.
7. Human Rabies Case may be presented as 1) Encephalitic or furious type, which is present in 80% of rabies cases, and 2) Paralytic or dumb type, which is seen in 20 %.
8. Classical signs of rabies include spasms in response to tactile, auditory, visual or olfactory stimuli (e.g. aerophobia and hydrophobia) alternating with periods of lucidity, agitation, confusion and signs of autonomic dysfunction.

SESSION 2 - ANIMAL BITE MANAGEMENT, PEP, PrEP

Learning objectives

- To describe the principles of Animal bite management and Rabies post/ pre-exposure prophylaxis
- To understand the Categorization of Animal Bite cases and their recommended treatment as per guidelines
- To demonstrate the administration of Intra-dermal Rabies vaccine and Rabies Anti- Serum
- To understand contraindication and precautions for Rabies vaccine and Rabies Antiserum and special situations
- To understand adverse reactions associated with for Rabies vaccine and Rabies Antiserum
- To describe the principles of counselling animal bite victims

In a Rabies endemic country like India where there is sustained dog-to-dog transmission, every animal bite is suspected as a potentially rabid animal bite, and treatment should be started immediately after exposure. As Rabies is practically 100% fatal, bites by dogs and cats, in particular, must be considered as a "medical emergency" and the "life-saving" post-exposure prophylaxis should be provided immediately.

POST EXPOSURE PROPHYLAXIS (PEP)

Since rabies is 100% fatal, PEP following an animal bite is life-saving and provides great relief to bite victims and apprehensive attendants. Pregnancy, infancy, old age and concurrent illness are not contraindications for anti-rabies treatment. Post-exposure prophylaxis is a three-pronged approach as given below. All three carries equal importance and should be done simultaneously as applicable to the exposure category.

Table 3: Steps in Management of Animal Bite Cases

A.	Management of animal bite wound(s) (including exposure assessment and wound washing)
B.	Active immunization with Anti-Rabies Vaccines (ARV)
C.	Passive immunization with Rabies Immunoglobulin (RIG) if indicated

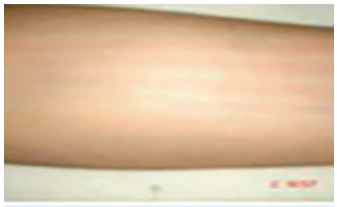
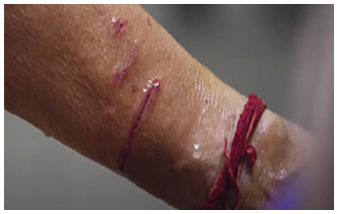
2.1 MANAGEMENT OF ANIMAL BITES WOUNDS

Since the Rabies virus enters the human body through a bite or scratch, the risk of rabies infection can be reduced if the wound is properly taken care of, however, it is often neglected. Prompt local treatment of all bite wounds and scratches is an important step in PEP. It is imperative to wash the wound thoroughly in order to remove as much saliva and thereby virus as possible. This is possible by efficient wound(s) management that should not involve additional trauma.

2.1.1 ASSESSMENT OF EXPOSURE

The most common modes of exposure to rabies virus are the following: Bite, Scratches and Licks on abraded skin. The treating physician first has to categorize the animal bite wound(s) and initiate treatment thereafter as provided in Table 4.

Table 4: Category of Exposure/ Bite

Type of contact, exposure and recommended post-exposure prophylaxis		
Category of Exposure	**Type of Exposure**	**Recommended Post Exposure Prophylaxis**
Category I	• Touching or feeding of animals • Licks on intact skin • Contact of intact skin with secretions/ excretions of rabid animal or human case 	•**None** (if reliable case history is available) •Wash exposed areas with **soap and running water** for 15 minutes and then **apply antiseptic**
Category II	• Nibbling of uncovered skin • Minor scratches or abrasions **without bleeding** 	•Wound Management - Wash exposed areas with s**oap and running water** for **15 minutes and then apply antiseptic** •**Rabies vaccine**
Category III	• Single or multiple **transdermal** bites or scratches • Licks on **broken skin** • **Contamination of mucous membrane with saliva eg. from licks** 	•**Wound management** •**Rabies Immunoglobulin** •**Rabies Vaccine**

NOTE: Bites by wild animals and all bites in forest areas should be considered as Category III exposure and treated accordingly.

2.1.2 WOUND MANAGEMENT

Washing of all wounds-

- The recommended first-aid procedures include immediate, thorough flushing and washing of each wound(s) for up to 15 minutes with soap and running water. This should be carried out as soon as possible followed by application of Povidone Iodine or another substance having virucidal activity.
- If soap or a virucidal agent is not available, the wound(s) should be thoroughly and extensively washed with water. Eyes and mucosa should be thoroughly rinsed with water.
- Immediate washing of the wound(s) is a priority. The maximum benefit of the wound(s) washing is obtained when fresh wound(s) are cleaned immediately.
- Since the Rabies virus, however, can persist and even multiply at the site of the bite for a long time, wound(s) management must be performed even if the patient reports late.
- The application of irritants (like chillies, oil, turmeric, lime, salt, etc.) is unnecessary and damaging. In case irritants have been applied on the wound(s), gentle washing with soap or detergent should be done to remove the external applicant/s followed by flushing with copious amounts of water.

Application of antiseptics:

- After thorough washing and drying of the wound(s), any one of the available antiseptic agents such as alcohol, etc. should be applied.
- Tetanus and antibiotic prophylaxis should be given if required. To prevent sepsis in the wound(s), a suitable course of an antibiotic may be recommended.

Suturing of wounds:

- Most severe bite wounds are best treated by a daily dressing, followed by secondary suturing when necessary.
- Secondary sutures are less likely to become infected and present better cosmetic results if done under optimal conditions.
- In case of need for suturing, cleansing of the wound cannot be avoided and the wound(s) should first be thoroughly infiltrated with Human or Equine RIG. Then the suturing should be delayed for several hours to allow diffusion of the immunoglobulin through the tissues before minimal sutures are done.
- Cauterization of wound(s) is no longer recommended as it leaves a bad scar and does not confer any additional advantage over washing the wound(s) with water and soap.

Table 5: Steps and rationale of wound management

	Steps in wound management	Rationale
Physical	Wash each wound with running water up to 15 mins	Mechanical removal of virus from the wounds.
Chemical	Clean the wounds with soap and Water Apply antiseptics.	Inactivation of the virus.
Biological	Infiltrate with RIG the depth and around the wound in Category III exposures and immuno-compromised patients with Cat II bite	Neutralization of the virus

SUMMARY

Dos:

- Washing of each wound(s) is/are desirable for up to 15 minutes and should be carried out as soon as possible.
- Gently clean wound/s with a detergent or any soap available.
- Apply available veridical topical preparation available antiseptic agent preferably Povidone Iodine. If unavailable alcohol may be used

Don'ts:

- Do not apply irritants to the wound(s) like lime, chilli powder, turmeric, tobacco coffee powder, plant saps etc. as these will propel the virus deeper to cause nerve infection and ultimately leading to rabies encephalitis and death.
- Avoid bandage or covering of the wound (wherever practicable or as far as possible) and open dressing is recommended.
- Do not cauterize the animal bite wound(s).
- Avoid primary suturing of the wound. If needed, loose sutures can be done after proper RIG infiltration with only minimal suturing. In long run, it is always better to do secondary closure of wounds after two weeks to develop seroconversion on Day 14 i.e. 0.5IU/ml.

2.2 ACTIVE IMMUNIZATION WITH ANTI-RABIES VACCINES (ARV)

2.2.1 ADMINISTRATION OF ANTI-RABIES VACCINES IN POST-EXPOSURE PROPHYLAXIS

Active immunization against Rabies is achieved by the administration of safe and potent cell culture vaccines (CCVs). Currently available CCVs could be administered by IM regimen and CCVs approved for ID use shall be administered by ID regimen. All WHO prequalified vaccines can be administered by either route.

The rabies vaccine is produced as one single IM dose with a potency of ≥ 2.5 IU per IM dose for PEP and PrEP. Every batch of CCVs must have minimum potency of 2.5 IU per IM dose, irrespective of whether the vaccine is administered by IM or ID route. (Annexure-9)

2.2.2 Site of Vaccination:

Anti-Rabies Vaccine should be administered into the upper arm (deltoid region) in adults and into the anterolateral thigh region of young children and never injected into to gluteal region. The gluteal region is not recommended because the fat present in this region retards the absorption of antigen and hence impairs the generation of the optimal immune response.

The injection sites for ID and IM vaccination are the same.

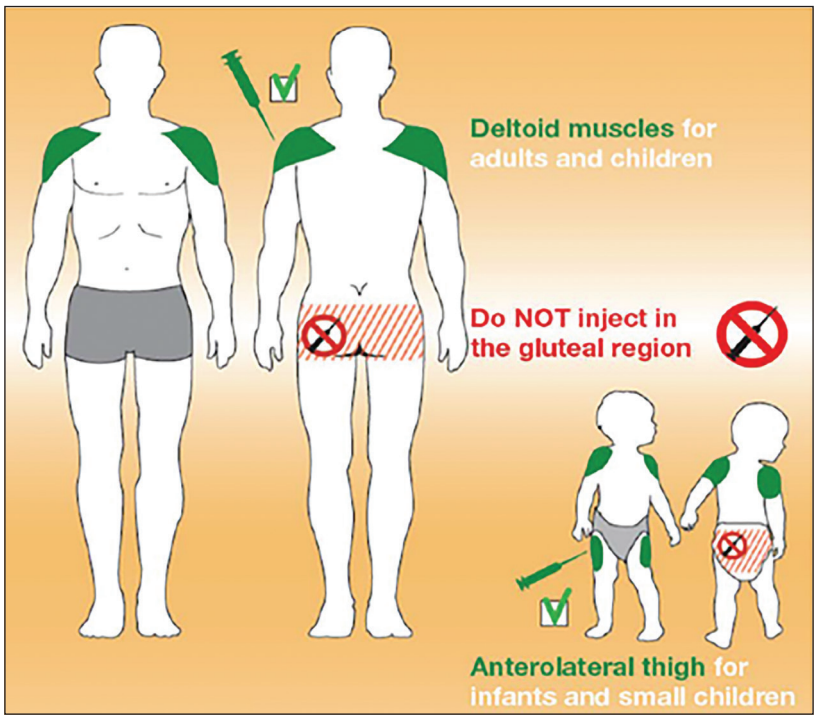


Figure 8 – Injection sites for anti-rabies vaccines.

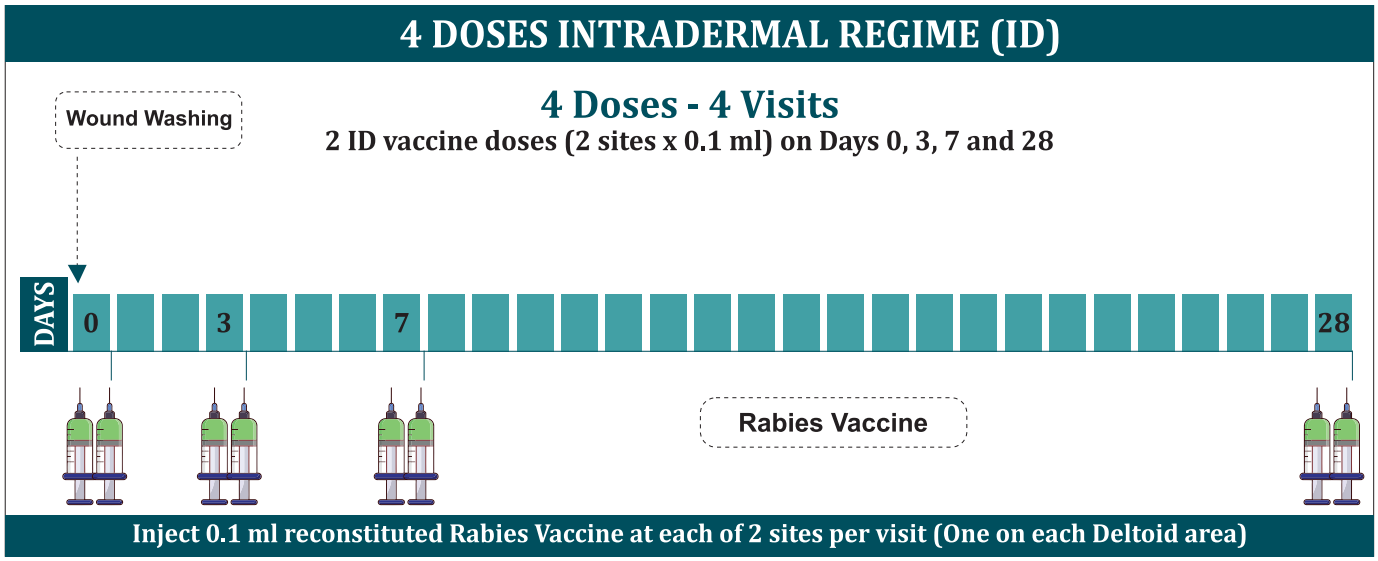
2.2.3 Route of Administration

National Rabies Control Program strongly advocates use of intradermal route of Rabies vaccine. The use of the intra-dermal route leads to considerable savings in the total amount of vaccine needed for full pre- or post-exposure vaccination, thereby reducing the cost of active immunization. Multiple studies show that the intradermal route of vaccination has an equal immunogenic response compared to the Intramuscular route of injection.

INTRADERMAL ROUTE OF VACCINE (IDRV) ADMINISTRATION

Updated Thai Red Cross (TRC) regimen (2-2-2-0-2):

0.1 ml of anti-rabies vaccine administered at 2 sites each on the deltoid area on days 0, 3, 7 & 28. There is no vaccine dose on day 14.



This is the only regimen approved by the Drug Controller General of India (DCGI) for intradermal usage of an anti-rabies vaccine in the country.

ID injection technique

Using the aseptic technique, reconstitute the vial of lyophilized vaccine with the diluent supplied by the manufacturer. Some vaccines have 0.5ml diluents while others have 1 ml diluents as per the approval of brand, which cannot be altered. After reconstitution with sterile diluent, the vaccine should be used immediately or within 6 hours if kept at 2-8^{0}C.

WHO recommended a uniform ID dose of 0.1 mL for all CCVs having potency equal to or greater than 2.5 IU per IM dose, based on well-designed clinical trials in 2004. (WHO expert consultation on rabies. First report. Tech rep series 931. Geneva (Switzerland): World Health Organization; 2005)

With a 1 ml syringe, draw 0.2 ml (up to 8 units if the syringe is 40 units or 20 units in 100 units syringe) of vaccine needed for one patient (i.e. 0.1 ml per ID site for 2 sites).

Expel the air bubbles carefully from the syringe thereby removing any dead space in the syringe.

Using the technique of BCG inoculation: stretch the surface of the skin and insert the tip of the needle with bevel upwards, almost parallel to the skin surface (Fig-8A) and slowly inject half the volume of the vaccine in the syringe (i.e. 0.1ml; 4 units/10 units) into the uppermost dermal layer of skin, over the deltoid area an inch above the insertion of the deltoid muscle. A raised bleb should begin to appear immediately causing a peau d'orange (orange peel) appearance (Fig-8B). Inject the remaining volume of vaccine (i.e. 0.1ml; 4 units/10 units) on the opposite deltoid area 1 inch above the deltoid insertion.

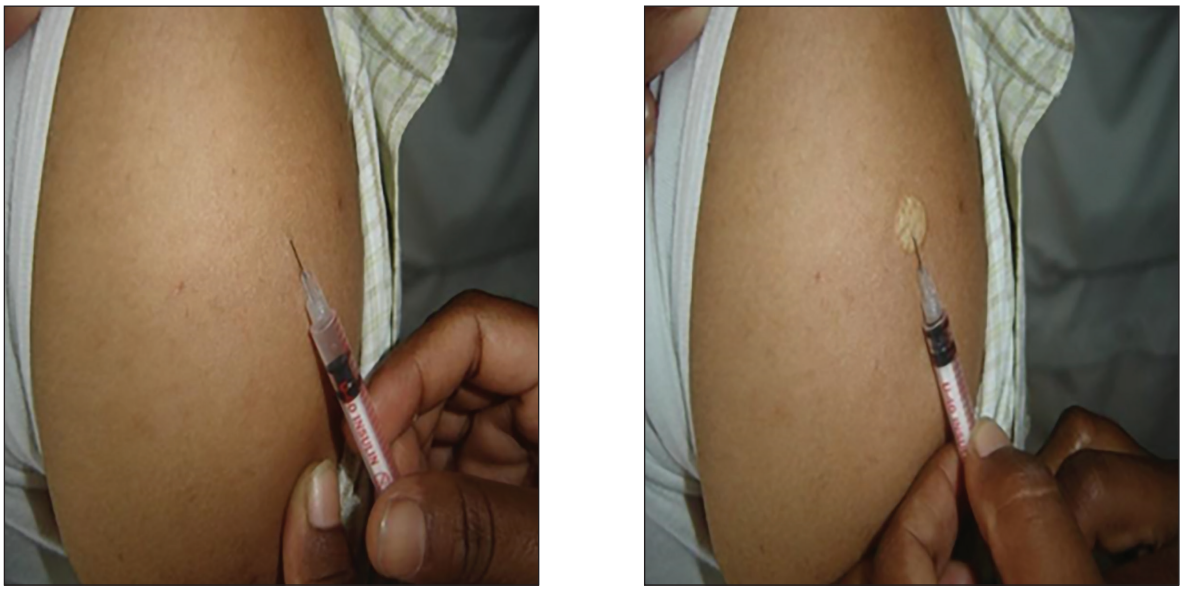


Figure 9: A & B: Intradermal administration of anti-rabies vaccines

- If the needle is incorrectly placed inside the dermis, resistance is felt while injecting the vaccine.
- If the vaccine is injected too deeply into the skin (subcutaneous), bleb (Peau d`orange) is not seen.
- Then the needle should be withdrawn and reinserted at an adjacent site and ID vaccine given once more.

If for some reason the deltoid region cannot be used for injection, then the alternate sites are the suprascapular area or the anterolateral thigh.

Once opened, vials should be stored at +2 ºC to a maximum+ 8 ºC for no longer than 6 hours. Rather than discarding vaccine after this time, any remaining vaccine in a vial could be used for PrEP, particularly for professionals active in animal disease control or for staff at health facilities who regularly attend to clinical rabies patients. Scheduling follow-up PrEP visits forpatients within similar periods may help to minimize wastage.

Mode of action of IDRV:

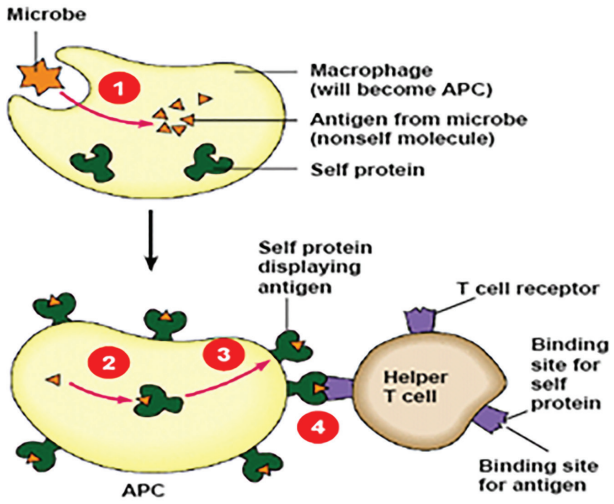


Figure 10: Mode of action of intradermal rabies vaccination

The anti-rabies vaccine is picked up by the antigen-presenting cells (Langerhans cells) present in the skin and presented to local regional lymph nodes which in turn elicit both humoral immunity (B cell-mediated) or cell-mediated immunity (T cell-mediated).

IDRV elicit an equal and effective immune response comparable to intramuscular administration of rabies vaccine.

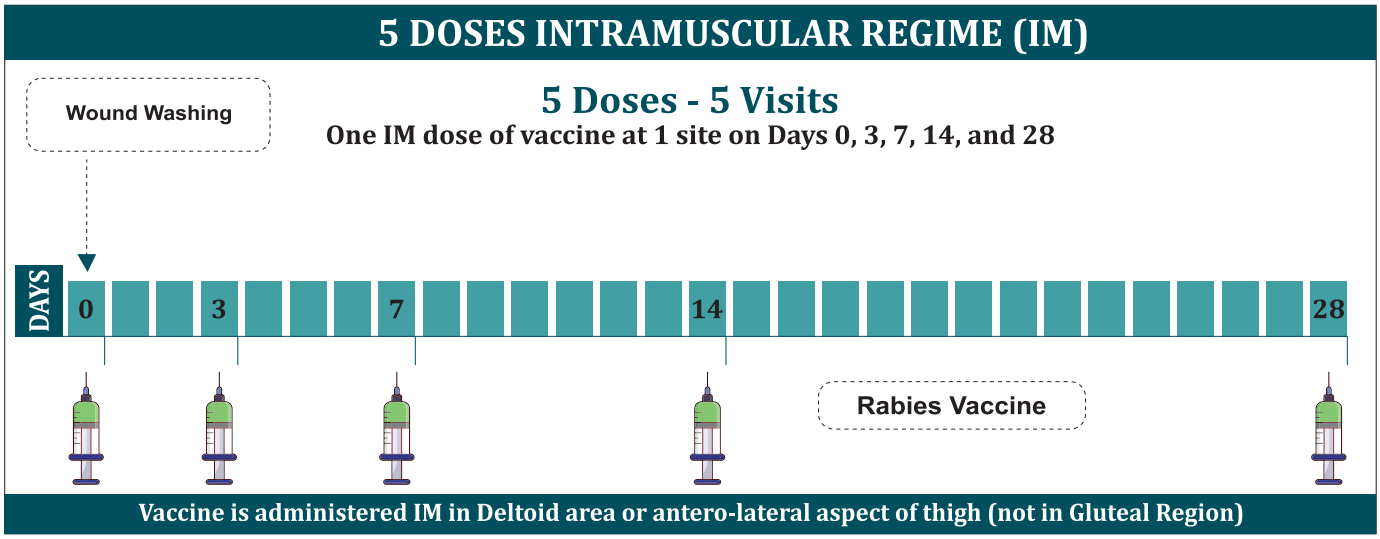
THE INTRAMUSCULAR ROUTE OF VACCINE ADMINISTRATION

Essen regimen (1-1-1-1-1):

One dose of anti-rabies vaccine administered intramuscularly on days 0, 3,7,14 & 28.

Anti-Rabies Vaccine is administered into the deltoid region in adults and into the anterolateral thigh region of young children and never injected into to gluteal region.

This is the only regimen approved by the Drug Controller General of India (DCGI) for intramuscular usage of the anti-rabies vaccine in the country.



Note: Switching the route of administration from IM to ID or vice versa and switch over from one type of modern rabies vaccine to other during PEP is not recommended.

Irrespective of route of administration completing the full course of PEP is essential to prevent the disease. Evidence suggests incomplete PEP may progress to Rabies disease.

2.3. PASSIVE IMMUNIZATION WITH RABIES IMMUNOGLOBULIN (RIG)

2.3.1 ANTI-RABIES IMMUNOGLOBULIN (RIG)

- Rabies Immunoglobulin (RIG) are anti-rabies antibodies with the ability to bind rabies virus. When injected locally into and around the wound(s), RIG will neutralize the rabies virus directly at the site of the bite providing passive immunity and immediate protection.
- Even the best of modern vaccines takes 10-14 days (or three injections minimum on days 0,3 and 7) to elicit the protective antibody titre (or more than 0.5 IU/mL of serum) and thus RIG cover this vulnerable short incubation (or window period) following exposures /severe wounds before it is physiologically possible for the victim to begin producing his/her antibodies
- Currently, two types of RIGs (ERIG & HRIG) are available for passive immunization (Annexure-1).

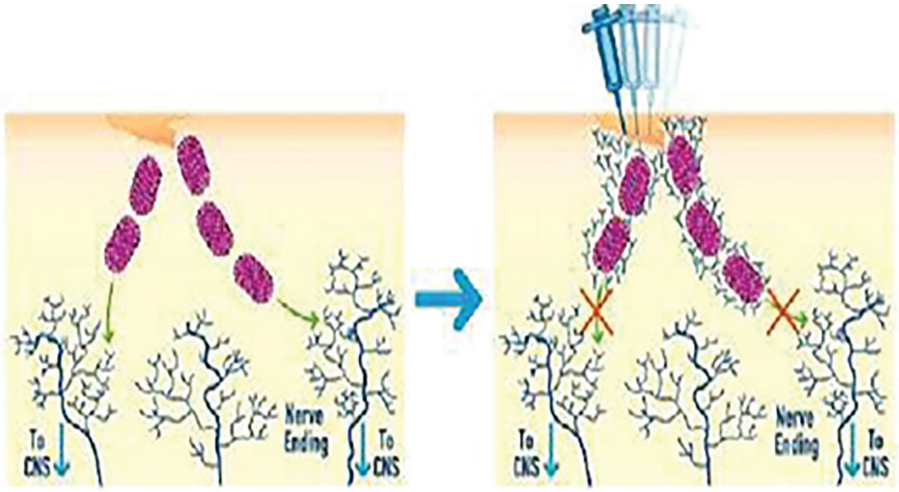


Figure 11: Rabies virus neutralization by RIG

Indications for RIG:

- RIG should be administered to all patients with Category III exposure.
- Exposures to all wild animals should be treated as Category III exposure.
- In immunocompromised individuals such as HIV/AIDS patients, patients on immunosuppressive therapy (steroids/cancer chemotherapy), congenital agammaglobulinemia etc., RIG should be administered in both Category II and III exposures.

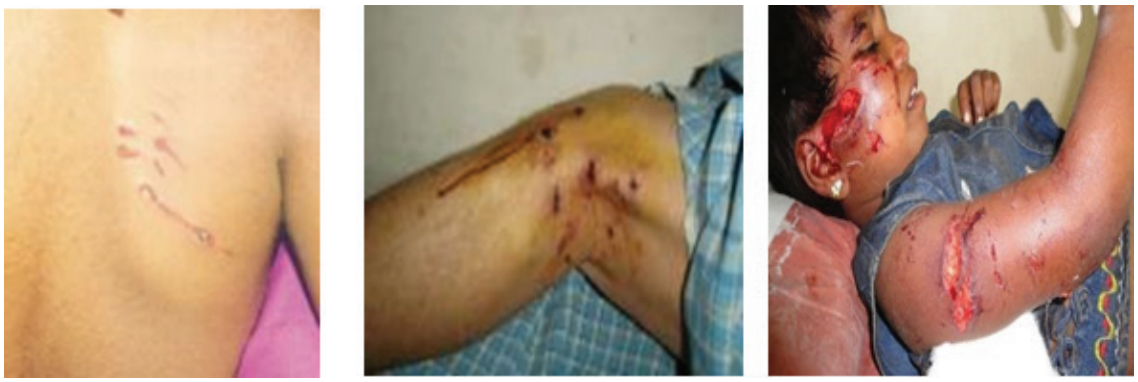


Figure 12: Category III exposures

RIG is administered only once if indicated, preferably at or as soon as possible after initiation of post-exposure vaccination.

- However, RIGs alone (without vaccine) should never be used.
- An infected bite wound is not a contraindication to the injection of RIG.

RIG is not indicated for bite victims that have ever received rabies vaccination (e.g. PrEP, PEP) beyond the seventh day after the first dose of the rabies vaccine, regardless of whether the doses were received on days 3 and 7, because an active antibody response to the rabies vaccine has already started, and this would represent a waste of RIG.

Equine rabies immunoglobulin (ERIG):

Equine Rabies Immunoglobulin (ERIG): ERIG is of heterologous origin produced by hyper-immunization of horses. ERIG is produced in the country in the public and private sectors. (Annexure 1: Currently available ERIG in India).

Currently manufactured ERIGs have highly purified Fab 2' fragments and the occurrence of adverse events has been significantly reduced. Since ERIG is of heterologous origin, it carries a small risk of an anaphylactic reaction (1/150,000).

A skin test before administering ERIG is generally not required because testing does not accurately predict adverse reactions, and ERIG should be given irrespective of the result of the test. However, some manufacturers of ERIG still recommend performing a skin test.

The treating physician should be prepared to manage anaphylaxis which, although rare, could occur during any stage of administration, even when the skin test is negative.

Human rabies immunoglobulin (HRIG):

Available as 150 IU/mL in 2 mL ampoule or prefilled syringes (300 IU/2 mL). Dosage is 20 IU/Kg body weight. There is no need to perform a skin sensitivity test (SST) as HRIG is homologous.

Table 6: Dose of Rabies immunoglobulin:

Generic Name	Preparation available	Dose
ERIG	**300 IU per ml**	**40 IU per kg bodyweight**
HRIG	**150 IU per ml**	**20 IU per kg body weight**

Mode of administration of the full dose of RIG

- The RIG should be brought to room temperature (25°C to 30°C) before administering to the patient.
- RIG is more effective if infiltrated immediately or earliest. However, RIG can be administered anytime if the person has not received any vaccine. But it is always beneficial to administer RIG at the earliest. It is important to infiltrate all wounds with RIG to neutralize the virus locally.
- The maximum dose of human RIG is 20 IU/kg of body weight, while that of equine immunoglobulin products is 40 IU/kg of body weight.
- In case of multiple wounds, the amount of RIG should not exceed the maximum permissible dose
- To cover all the wounds RIG can be diluted maximum with normal saline. Initially, the focus on these patients should be on proper wound toilet before administration of RIG.
- No wound should be missed for RIG administration.
- The entire immunoglobulin dose, or as much as anatomically possible (but avoiding possible compartment syndrome), should be infiltrated carefully into the edges and base of the wound(s) or as close as possible to the wound(s) or exposure sites till traces of RIG oozes out.

- Tip of the finger(s), toe(s), ear lobe(s) or bites on the nose or around the eye can be safely injected with RIG provided the injection is not done with excessive pressure, which can cause compression syndrome.

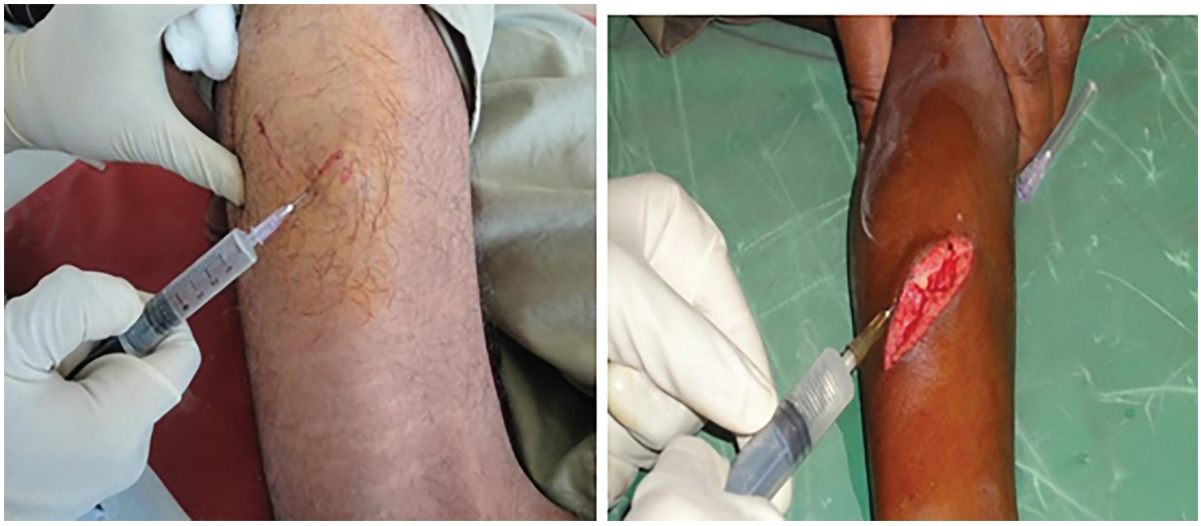
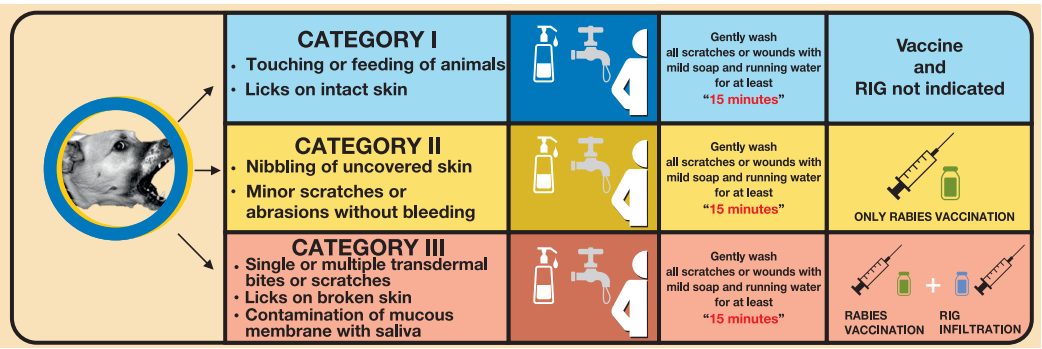


Figure 13: Administration of Category III wounds with RIG

- It is preferable to use separate needles for infiltrating different wounds. Multiple needle injections into the wound should be avoided as far as possible.
- RIG should never be administered in the same syringe or at the same anatomical site where the vaccine was administered.
- For mucosal exposure with no wound, rinsing with RIG can be considered.
- Systemic [intramuscular] administration of RIG is of very little value and evidence suggests that injecting the remaining RIG volume intramuscularly at a distance from the wound provides little or no additional protection against rabies as compared with infiltration of the wound(s) alone.
- However, there is a high likelihood that there are additional small wounds (e.g. if a child does not report all wounds), injection of the remaining RIG volume intramuscularly as close as possible to the presumed exposure site, to the degree that is anatomically feasible, is indicated.
- In the case of suspected exposure to RABV via aerosols, an intramuscular injection of RIG is still recommended.
- As for all immunizations, animal bite victims should be kept under observation for at least 15–20 min after administration of RIG and there is no need to admit the patient.
- It is advisable to also provide Inj. Tetanus Toxoid (TT) or Td (adult dT) vaccine 0.5 ml intramuscularly and course of antibiotics with analgesics if required.

Note: RIG must never be given intravenously

Summary of Rabies Post-Exposure Prophylaxis



2.4 MANAGEMENT OF RABIES PEP DURING RE-EXPOSURE FOR PREVIOUSLY IMMUNIZED PEOPLE:

a) For exposed or re-exposed patients who can document previous complete PrEP or PEP the following applies:

- Wound washing (Good wound management)
- One-Site Intradermal vaccine administration on days 0 and 3 or
- One-site Intramuscular administration of an entire vaccine vial on days 0 and 3.
- No RIG indicated

b) People, who cannot document previous PEP equivalent to PrEP or a complete PrEP , should receive a full PEP, including RIG if indicated.

c) If after completion of a complete course of PEP or PrEP, a re-exposure happens within 3 months then only thorough wound washing is to be done. The rabies vaccine is not required. If the duration of the last dose of the complete rabies vaccine regimen is more than 3 months then the Rabies vaccine is to be given as described in the schedule above.

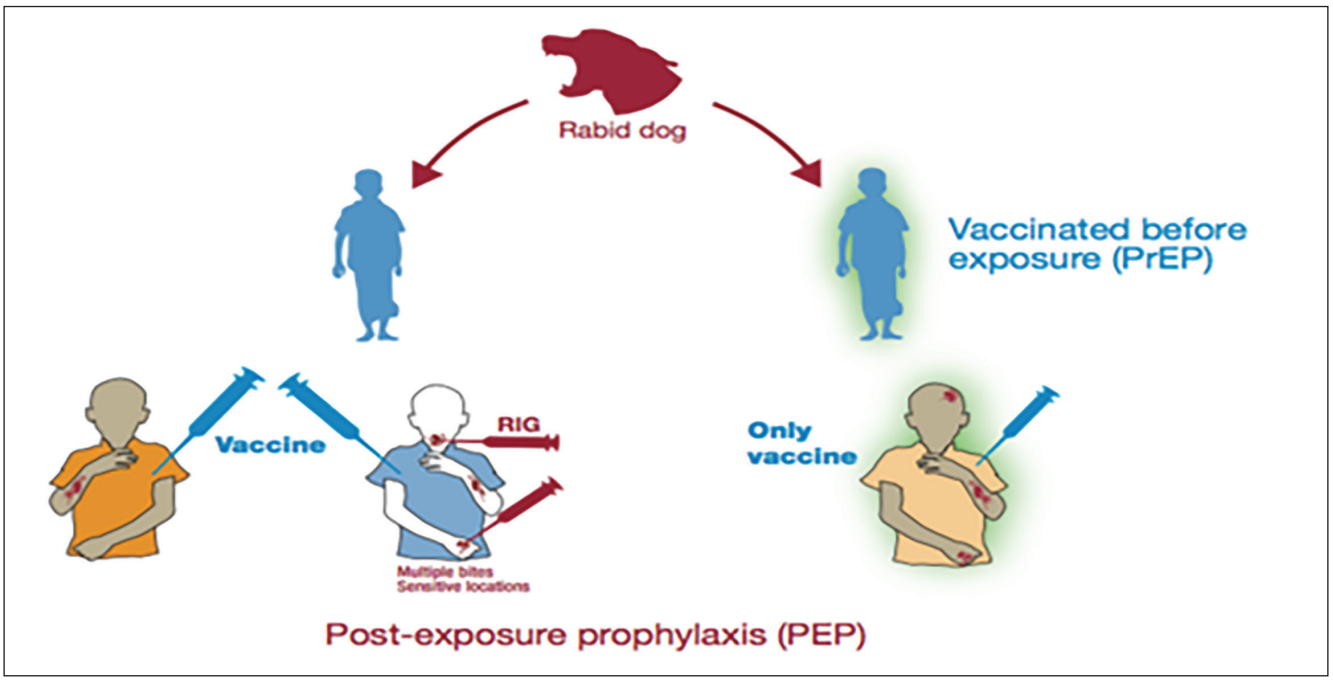


Figure 14: Flow of Post Exposure Prophylaxis

2.5 RABIES PEP FOR IMMUNOCOMPROMISED PATIENTS

- People with a documented immune deficiency should be evaluated individually. Patients with immune-compromised conditions (HIV/AIDS, patients on chemotherapy, long term steroid therapy, cancer patients, etc.) have been reported to have a significantly lower or no detectable neutralizing antibody response to Rabies vaccination.
- In most settings, it is not possible to determine the source or severity of immune suppression when patients consult for PEP.
- Whenever possible, the best PEP options available (the most immunogenic regimen, high-quality vaccines and RIG) should be used, regardless of the route of vaccine administration. Meticulous, very thorough wound-cleaning as a first aid to bite victims is of utmost importance in immunocompromised patients.
- If required, the RABV neutralizing antibody response should be determined 2–4 weeks/after 14 days of the last dose of vaccination to assess whether an additional dose of vaccine is required.

- If possible, an infectious disease specialist or the patients' treating clinician with expert knowledge or the patient's disease history should be consulted. The wide variation in the causes of a compromised immune system and the limited information available indicate the need for targeted studies.

In Immune Compromised Individuals and patients in whom the presence of immunological memory is no longer assured, the following protocol should be followed-
i. Good wound management (including meticulous, very thorough wound washing and antisepsis) accompanied by local infiltration of Rabies immunoglobulin (RIG) for both Category II and III exposures. ii. After this, a complete course of Anti-Rabies vaccination by Intramuscular Route should be undertaken in both Category II and III exposures.
iii. Preferably, if the facilities are available, Anti-Rabies Antibody estimation should be done 14 days after the completion of the course of vaccination to assess the need for additional doses of vaccine.

2.6 ANIMAL CONSIDERATIONS FOR PEP

2.6.1 Observation of biting dog/cat:

Human health professionals are responsible for taking care of the bite victims while animal health professionals evaluate the biting animal in parallel. In general, rabies PEP should be started immediately after the exposure.

An observation period of 10 days is valid for dogs and cats only: the natural history of rabies in mammals other than dogs and cats is not fully understood and therefore the 10-day observation period is not applicable in such animals.

The treatment may be modified if the suspected dog or cat involved in the incident is healthy after the end of the 10-day observation period and post-exposure prophylaxis can be converted to pre-exposure vaccination by skipping the vaccine dose on day 14 and administering it on day 28 while using Intramuscular regimen (Essen Schedule).

While using the ID route of administration complete course of vaccination should be given irrespective of the status of the animal.

2.6.2 Vaccination status of the biting animal:

Although unvaccinated animals are more likely to transmit Rabies, vaccinated animals can also transmit the virus in case of ineffective vaccination for any reason. Animal vaccine failure may occur because of improper storage, administration or poor quality of the vaccine, poor health status of the animal, and the fact that one vaccine dose not always protect against rabies infection in dogs/cats.

Therefore, in absence of laboratory documentation of immunization (antibody titre) a history of Rabies vaccination in an animal does not guarantee that the biting animal is not rabid and the vaccination status is not a factor for proper risk assessment.

Hence, irrespective of vaccination status of the biting animal, PEP should be given.

2.6.3 Provoked versus Unprovoked Bite:

A bite by a provoked animal does not mean that the animal is not rabid. Therefore, a provoked dog bite should also be managed as an exposure thus PEP should be started immediately.

There are various factors in understanding the reason for the animal being provoked and hence it would be difficult to ascertain the reasons behind the provoking and therefore it is necessary to start PEP at the earliest.

2.7 DEVIATIONS IN PEP SCHEDULE;

PEP should be started as soon as patients report to the health facility, irrespective of time-lapse after the animal exposure. Health personnel are required to strictly follow recommended PEP schedule to prevent PEP failure. The patient should be informed clearly about the schedule verbally and in a written prescription. Once the decision to initiate rabies PEP has been made, the PEP regimen should be started as soon as possible. Every effort should be made to adhere to the recommended PEP regimen schedule,

The first three doses of the PEP i.e. doses on day 0, day 3 and day 7 should be completed maximum within 7-10 days to achieve effective immunity against the rabies virus.

One- or two-days' deviation does not necessitate re-starting of the vaccination schedule. The remaining doses should be as per the original schedule starting from the day zero dose. For most minor delays or interruptions, the vaccination schedule can be shifted and resumed as though the patient were on schedule.

However, in instances when the patient fails to visit on the scheduled dates of the first three doses and misses one or more doses, the administration of an additional dose should be considered to obtain effective immunity.

2.8 CONTRAINDICATIONS AND PRECAUTIONS TO BE TAKEN IN POST-EXPOSURE PROPHYLAXIS

There are no absolute contraindications for administration of PEP.

PEP can be safely given to infants, pregnant women and immune-compromised individuals, including children with HIV/AIDS. It should be given as indicated by the nature of the exposure in a setting in which the staff are adequately trained in its administration and the management of possible adverse reactions, as for any other vaccination. As per all other vaccinations, recipients receiving ARV should be kept under medical supervision for at least 15 mins to monitor any possible adverse reactions.

2.9 ADVERSE REACTIONS TO RABIES BIOLOGICAL ADMINISTRATION

In general, anti-rabies vaccines are safe and well-tolerated. Mild systemic adverse events, such as transient fever, headache, dizziness and gastrointestinal symptoms, have been observed in 5–15% of vaccinated people. Minor and transient erythema, pain or swelling may occur at the site of injection, particularly following ID administration.

Once initiated, , it shouldn't be stopped or altered due to local or minor systemic side effects from the vaccine. Anti-inflammatory and antipyretic medications like ibuprofen or acetaminophen are frequently effective in treating such reactions.

Antihistamines can be given when a person who has a history of hypersensitivity to the rabies vaccine needs to be revaccinated. Following vaccination, the person should be closely monitored and epinephrine should be ready in hand to treat any anaphylactic responses.

In case of history of severe hypersensitivity reaction considering rabies is 100% fatal disease advice and assistance on the management of serious adverse reactions for persons receiving rabies vaccines may be sought from experts.

All clinically significant adverse events occurring following administration of rabies biologics should be reported to the Adverse Effect Following immunization (AEFI) portal & Pharmacovigilance program of India.

2.10 POST-EXPOSURE TREATMENT FAILURES: REASONS FOR FAILURE

- Late reporting by patients.
- Improper or inadequate wound washing, unnoticed wounds.
- Application of irritants to bite wounds.
- Suturing of bite wounds without local infiltration of RIG.

- Non-administration of RIGs.
- Incomplete infiltration of all wounds, full dose of RIG administered intramuscularly.
- Incomplete vaccination.
- Administration of rabies vaccines into the gluteal region.
- Inoculation of rabies virus directly into the nerve in extensive & deep bites.
- Immune compromised patients.

True vaccine failures are extremely rare when high-quality rabies vaccines are used in conjunction with prompt, proper wound care, adherence to the cold chain and compliance with vaccination schedules.

Hence, early, appropriate and complete PEP shall be provided to all animal bite cases in the country to prevent rabies.

2.11 NEWER ADVANCEMENT IN POST-EXPOSURE PROPHYLAXIS

WHO has recommended the use of Monoclonal Antibodies (mAb) as a "cocktail" containing at least two antibodies against RABV, as alternatives for RIGs in PEP. A monoclonal antibody product is recently licensed by DCGI in India. WHO recommends that a registry be maintained to monitor the clinical use and outcomes of mAb products for rabies PEP. The expert group recommends that the role of Monoclonal antibodies in the case of category III bites as a replacement to Rabies Immunoglobulin needs to be studied with regards to its effectiveness and safety in multi-centric Indian settings before incorporation in National Guidelines.

2.12 ADVICE & COUNSELLING OF ANIMAL BITE VICTIMS

Animal bites and rabies exposures are very pain- and stressful experiences. Due to conflicting messages, the patients are very anxious and worried, especially children and pregnant women. Therefore, for every case, at least 5-10 min must be spent by doctors to reassure them, alleviate anxiety and remove fear.

Good counselling and dialogue with the patient and the attendants greatly build trust and confidence and eliminate possible conflicts.

Other advice that should be given during the vaccination period:

- Do not rub the injection site.
- Do not apply anything to the injection site.
- Avoid excessive alcoholic drinks and restrict smoking.
- Avoid strenuous physical and mental work.
- No specific dietary restrictions are recommended.
- Take bath regularly (but do not wet the wound).
- Discourage chilli paste, other irritants at bite site.
- Discourage home remedies and domiciliary practices.
- Take prescribed tetanus toxoid, analgesic/anti-inflammatory, and antibiotic as per advice.
- Do not apply any other cream to the wound or any dressing or bandage.
- Continue medications (if undergoing) for other prolonged treatments.
- Emphasize the life-saving value of anti-rabies treatment and the need for compliance to complete the course of vaccination.
- Inform about schedule dates of vaccines and the importance of timely administration of rabies vaccine.
- Wherever relevant and feasible: observe the dog/cat daily for 10 days and on suspicion, get a veterinary examination done and inform the doctor.

SPECIAL SITUATIONS

Rabies does not give second chance as it is 100% fatal once disease occur. Hence, it is better to over treat rather than under treat animal bite cases.

Persons consuming raw milk of rabid animals: One should boil the milk before consumption in their day-to-day practice which will kill the rabies virus. There are no documented cases of transmission of rabies after drinking milk of rabid animal. Consumption of milk produced by rabid animal dose not require rabies PEP.

Persons consuming meat of rabid animals: Rabies can be transmitted by ingestion of experimentally infected animals; however, no human cases resulting from consumption of raw meat from a rabid animal have been documented. It is not advisable to consume the meat from a rabid animal, particularly if it is raw. If exposure occurs, PEP should be initiated.

Pregnancy and Lactation: Pregnancy and Lactations are not the contraindication for starting PEP as rabies is a fatal disease. Vaccines are safe and effective in pregnant and lactating women. Dosage and schedule remain same.

HIV/AIDS with low CD4 count <200: Thorough wound treatment + RIG (Category II & III exposures) + 5 doses of vaccine by IM only. If feasible RvmAb response should be determined 2-4 weeks after completion of 5 doses to assess whether additional dose of vaccine is required.

Chloroquine therapy: Vaccination with IM route only.

Previous history of severe adverse reaction to ARV: Change the type of vaccine subsequently.

Switch over from one brand/type of vaccine to other: Shifting from one brand/type of CCV/PDEV to other brand/type should not be encouraged in routine practice. However, under unavoidable circumstances, available brand/type may be used to complete PEP.

Switch over from IM to ID route of administration or vice versa during PEP: Shifting from one route to other i.e., IM to ID or vice versa during PEP is not recommended as there is no sufficient scientific evidence / study on vaccine immunogenicity following changes in route of vaccine administration during PEP. As per WHO recommendations, such cases need not be restarted and regimen to be continued/ resumed as per new administration route.

Irregular and incomplete vaccination: As a general thumb rule, 3 doses of ARV have to be administered by day 10 and 4/5 doses (either by IM or ID route) by day 28. There is no need to restart the vaccine, if there is delay of few days.

Patient come very late (few weeks or months) after animal bite: PEP should be given as rabies has a prolonged incubation period. If patient has not taken any dose of ARV, even RIG/ should be injected to the site of bite, even though there are no bite marks seen.

Can Rabies vaccine be given with other UIP vaccines: Yes, it should be given at a site different from UIP vaccine, but rabies vaccine should be given in deltoid/ thigh region by IM route or on both deltoid by ID route.

2.13 PRE-EXPOSURE PROPHYLAXIS (PrEP)

Pre-exposure vaccination may be offered to high-risk groups such as:

1. Laboratory staff handling the virus and infected material, clinicians and persons attending to human rabies cases.
2. Veterinarians, animal handlers and dog catchers.
3. Wildlife wardens, quarantine officers etc.
4. Travelers from rabies-free areas to rabies endemic areas.

The Indian Association of Pediatrics (IAP) has recommended pre-exposure prophylaxis for children. This may be considered voluntarily.

2.13.1 Schedule & Dosage

- Pre-exposure vaccination is administered as one full vial of vaccine by IM route or in the case of the ID route, one site 0.1 ml on days 0, 7 and either day 21 or 28.
- High-risk groups should have their neutralizing antibody titers checked every 6 months during the initial two years period after the primary vaccination. If it is less than 0.5 IU/ml a booster dose of vaccine should be given. Subsequently, sero-monitoring is recommended every two years.
- 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 0.5IU/ml.
- Vaccinated Individuals on being exposed after successful pre-exposure immunization would require only two booster injections of vaccine given on days 0 and 3. RIGs is not required.

SUMMARY OF VACCINATION SCHEDULES

Table 8: Vaccination schedule

Type of prophylaxis	Route of administration	Dose of vaccine	Day of dose	Number of injections per visit	Total number of visits	Site of injection
Post-Exposure Prophylaxis	Intradermal	0.1ml per dose	Day 0, 3, 7 and 28	2	4	Adults: Deltoid Muscle Infants and Small Children: Anterolateral Thigh
	Intramuscular	1 entire vaccine vial	Day 0, 3, 7, 14 and 28	1	5	
Pre-Exposure Prophylaxis	Intradermal	0.1ml per dose	Day 0, 7, and 21 or 28	1	3	
	Intramuscular	1 entire vaccine vial	Day 0, 7, and 21 or 28	1	3	
Re-exposure (no vaccination needed if full PEP has been received in the last 3 months)	Intradermal	0.1ml per dose	Day 0 & 3	1	2	
	Intramuscular	1 entire vaccine vial	Day 0 & 3	1	2	

POINTS TO REMEMBER

- Stepwise approach in management of Animal Bite Cases consist of A) local treatment of wound(s) including assessment of exposure followed by B) Administration of anti-rabies vaccination (either by IM/ID route) and C) administration of Rabies immunoglobulin if indicated including advice and counselling of patient & attendants.
- Risk of rabies infection can be reduced to an extent of 50% if wound is properly taken care and washing of wound(s) is/are desirable up to 15 minutes and should be carried out as soon as possible with soap and water. Suturing of wounds should be avoided.
- Touching or feeding of animals or licks on intact skin (Cat- I) require no further treatment besides washing of the exposed skin surfaces if reliable history is available.
- Minor scratches or abrasions without bleeding or nibbling of uncovered skin (Cat- II) requires only local treatment of wound(s) and administration of anti-rabies vaccine.
- Single or multiple transdermal bites or scratches with oozing of blood, licks on broken skin or contamination of mucus membrane with saliva (Cat- III) requires wound management and administration of rabies immunoglobulin (RIG) with anti-rabies vaccine
- RIG is also indicated after Cat II / III exposure of wild animals and in immunocompromised patients.
- There are no absolute contraindications for administration of PEP.
- Anti-Rabies Vaccine is administered into deltoid region in adults and into anterolateral thigh region of young children and never injected into to gluteal region.
- Updated Thai Red Cross (TRC) regimen (2-2-2-0-2) for intradermal administration consist of 0.1 ml of anti-rabies vaccine administered at 2 sites each on deltoid area on days 0, 3, 7 & 28. There is no vaccine dose on day 14. This is approved by DCGI.
- Essen regimen (1-1-1-1-1) for intramuscular administration consist of one dose of anti-rabies vaccine administered intramuscularly on days 0, 3,7,14 & 28. This is approved by DCGI.
- RIG is administered only once, preferably at or as soon as possible after initiation of post-exposure vaccination. It is not indicated if PrEP or PEP has ever been administered before or beyond the seventh day after the first dose of any rabies vaccine.
- Proper counselling and dialogue with the animal bite victims and attendants greatly build trust and confidence and eliminates possible conflicts.

SESSION 3 – LABORATORY DIAGNOSIS AND CASE MANAGEMENT OF HUMAN RABIES

Learning objectives

- To understand different possibilities for laboratory rabies diagnosis
- To be able to take most appropriate sample for rabies ante and post mortem diagnosis and to understand the limitations
- To know about safety procedures and how to ship samples
- To provide palliative care for rabies patients
- To give recommendations for family members of rabies patients

3.1 LABORATORY DIAGNOSIS OF HUMAN RABIES

Rabies is characterized as an acute, progressive encephalitis caused by a lyssavirus. Often the diagnosis of rabies is based on the clinical manifestations and a history of exposure to a rabid animal. In cases where pathognomonic hydrophobia and/or aerophobia are present, the diagnosis is straightforward. However, clinical diagnosis may be difficult in cases of paralytic rabies and atypical presentations. Rabies should be considered for patients with acute atypical encephalitis or acute flaccid paralysis (including those in whom Guillain Barré syndrome is suspected. For a definite, reliable diagnosis thus, rabies laboratory confirmation is necessary and must be done whenever feasible.

3.2 LABORATORY CONFIRMATION OF RABIES

In general, rabies diagnostics can be divided into tests that are performed when the patient is still alive (ante-mortem diagnostics) and tests that are performed after the patient has died (post-mortem).

Different laboratory tests call for different specimen and the sensitivity and specificity varies. Secretions and biological fluids (such as saliva, CSF, tears, serum) and some tissues (such as skin biopsy samples, including hair follicles at the nape of the neck) can be used to diagnose rabies while still alive. For post-mortem diagnostics, usually brain samples are used.

An overview of all the available standard diagnostic tests for rabies can be found in Table 9.

Table 9: Standard diagnostic tests for diagnosis of rabies in humans (as per World Health Organization. (2018). WHO expert consultation on rabies: third report. World Health Organization. https://apps.who.int/iris/handle/10665/272364)

Species (Time of Test)	Antigen detection		RNA detection		Virus Isolation		Antibody detection	
	Sample a	Test b	Sample a	Test b	Sample a	Test b	Sample a	Test b
Human (ante-mortemc)	Skin/ Hair follicles	FAT	Skin/ Hair follicles, Saliva, Tears CSF	RT-PCR[d]	Saliva, Tears, CSF	RTCIT, MI	Serum, CSF	RFFIT, FAVN- Test IFA ELISA
Human (post-mortem)	Brain, Skin/ Hair follicles	FAT, DRIT, IHC	Brain, Skin/ Hair follicles	RT-PCRd	Brain	RTCIT, MI	NA	NA

Abbreviations: CSF, cerebrospinal fluid; DRIT, direct rapid immunohistochemical test; ELISA, enzyme-linked immunosorbent assay; FAT, direct fluorescent antibody test; FAVN, fluorescent antibody virus neutralization; IFA, indirect immunofluorescence; IHC, immunohistochemistry on formalin-fixed samples; MI, mouse inoculation test; NA, not applicable; RTCIT, rabies cell culture inoculation test; RT-PCR, reverse transcriptase-polymerase chain reaction; RFFIT, Rapid Fluorescent Focus Inhibition Test

a) If more than one sample type is listed, the one(s) shown in bold have the highest diagnostic sensitivity.

b) If more than one test is listed, the one(s) in bold are preferred.

c) Positive results in antemortem samples are diagnostic, but negative results do not rule out rabies.

d) RT-PCR may be in the conventional or real-time format.

3.3 COLLECTING SPECIMEN FOR RABIES DIAGNOSTICS

The clinician who suspects that the case is compatible with the clinical description and has an epidemiological link to confirmed or suspected animal cases or contaminated animal products, may recommend for the Laboratory diagnosis.

Rabies has the highest case fatality rate of any currently recognized infectious diseases, therefore, safety is of paramount importance when working with lyssaviruses. In general, biosafety level 2 practices are adequate for routine activities. Collection, preparation and processing of samples should be done by using appropriate personal protective equipment including mask, protective gloves, sleeved gowns and safety glasses.

Professionals working with rabies patients, collecting samples and performing diagnostic tests, should be vaccinated against rabies according to pre-exposure guidelines.

Table 10 provides an overview of the different type of samples that can be used for diagnostic purposes.

Table 10: Sample type and tests to be performed

	TYPE OF SAMPLE	**LABORATORY TESTS TO BE PERFORMED**
I	Saliva (Ante Mortem)	
	Using a sterile eyedropper pipette, collect saliva and place it in a small sterile container that can be sealed securely. No preservatives or additional material should be added. Tracheal aspirates and sputum are not suitable for rabies tests. Take at least three saliva samples at 3hrs to 6hrs intervals.	Detection of rabies RNA (by reverse transcription and polymerase chain reaction, RT/PCR, of extracted nucleic acids) and isolation of the infectious virus in cell culture.
II	Nuchal Skin Biopsy (Ante Mortem/ Post Mortem)	
	A section of skin 5 to 6 mm in diameter should be taken from the posterior region of the neck at the hairline. The biopsy specimen should contain a minimum of 10 hair follicles and be of sufficient depth to include the cutaneous nerves at the base of the follicle. Place the specimen on a piece of sterile gauze moistened with sterile water and place it in a sealed container. Do not add preservatives or additional fluids.	RT/PCR and immune fluorescent staining for viral antigen in frozen sections of the biopsy.
III	Serum and cerebral spinal fluid (CSF) (Ante Mortem)	
	At least 0.5 ml of serum or CSF should be collected; no preservatives should be added. Do not send whole blood. If no vaccine or rabies immune serum has been given, the presence of antibody to rabies virus in the serum is diagnostic and tests of CSF are unnecessary. Antibody to rabies virus in the CSF, regardless of the immunization history, suggests a rabies virus infection.	Indirect immunofluorescence and virus neutralization.

IV	Brain Biopsy (Post Mortem)	
	The rarity of rabies and the lack of an effective treatment make the collection of a brain biopsy unwarranted; however, biopsy samples negative for herpes encephalitis should be tested for evidence of rabies infection. The biopsy is placed in a sterile sealed container; do not add preservatives or additional fluids.	RT/PCR and immune fluorescent staining for viral antigen in touch impressions. Post-mortem diagnosis of rabies is made by immunofluorescent staining of viral antigen in touch impressions of brain tissue. Portions of the medulla (brain stem), the cerebellum, and the hippocampus

3.4 ANTE MORTEM DIAGNOSIS OF RABIES

- Ante-mortem diagnosis of human rabies can be done by detection of viral RNA by molecular methods like polymerase chain reaction (PCR) in saliva, nuchal skin and cerebrospinal fluid (CSF).
- Detection of virus-specific antibodies in CSF and serum samples using ELISA or rapid fluorescent focus inhibition test (RFFIT) can also aid in diagnostic confirmation, especially in unvaccinated individuals.
- A combination of several tests on multiple clinical samples, with serial sampling whenever feasible, is recommended to increase the sensitivity of ante mortem diagnosis.
- While a positive validated result is indicative of rabies, a negative result does not essentially rule out a diagnosis of rabies in all cases, which is a major limitation of ante mortem testing.
- Secretions, biological fluids (such as saliva, CSF, serum) and some tissues (such as skin biopsy samples, including hair follicles at the nape of the neck) can be used to diagnose rabies during life. Although serum and CSF may not be very sensitive specimens for ante mortem diagnosis, particularly in the early course of illness, a positive result provides valuable diagnostic information.
- The samples that afford the highest diagnostic sensitivity are at least three saliva samples, taken at intervals of 3–6 h, and skin biopsies (including hair follicles). Ideally, samples should be stored at -20 °C or less.

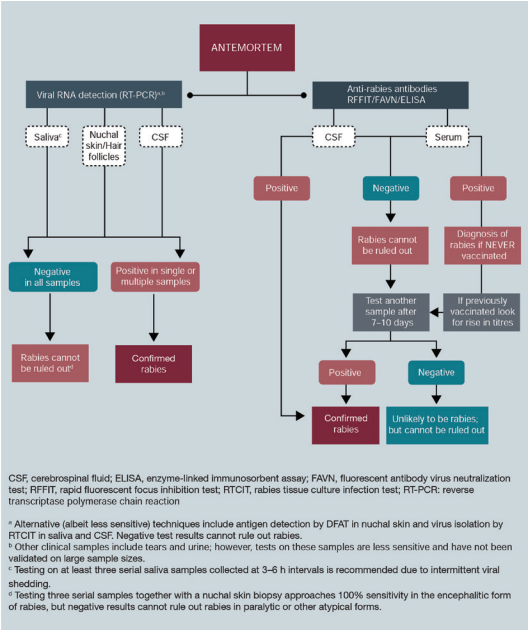


Figure 15 - World Health Organization (2018). Laboratory techniques in rabies, volume 1, 5th ed. World Health Organization. https://apps.who.int/iris/handle/10665/310836 - Fig. 5.1. Algorithm for human rabies antemortem diagnosis

3.5 POST MORTEM DIAGNOSIS OF RABIES

- Brain tissue is the preferred specimen for post-mortem diagnosis in both humans and other animals. In many situations, it may not be possible to remove the brain for post-mortem sampling because of factors such as family consent for post mortem or practical and biosafety issues related to the removal of brains in the field.
- Some of these challenges can be overcome by collecting samples with effective, well-established techniques that require less invasive post-mortem routes, such as through the orbit or foramen magnum.
- Ideally, brain tissue should be kept refrigerated or frozen until testing. If this is not possible, samples can be preserved at ambient temperature in a 50% glycerine–saline solution. Freezing of samples in glycerine is not recommended.
- The glycerine must be removed by washing before testing, and acetone fixation is not recommended before the direct fluorescent antibody test.
- The gold standard for laboratory confirmation of rabies is viral antigen detection in brain tissue obtained post-mortem using the Fluorescent Antibody Technique (FAT). It is a rapid and sensitive technique to identify viral antigens in fresh brain smears stained with anti-nucleoprotein antibodies tagged to fluorescent dyes and visualized under a fluorescent microscope.
- Histological identification of inclusion bodies ('Negri bodies') by Seller's technique (on smears from fresh brain tissue) or by haematoxylin and eosin (H&E) staining (on sections of formalin-fixed, paraffin-embedded brain tissues can be useful as a complementary test but is not recommended by WHO for primary diagnosis, since a negative result cannot rule out rabies.
- Post mortem brain tissue can be obtained by craniotomy at autopsy or through the trans nasal, orbital or trans foramen magnum route, when an autopsy cannot be performed.

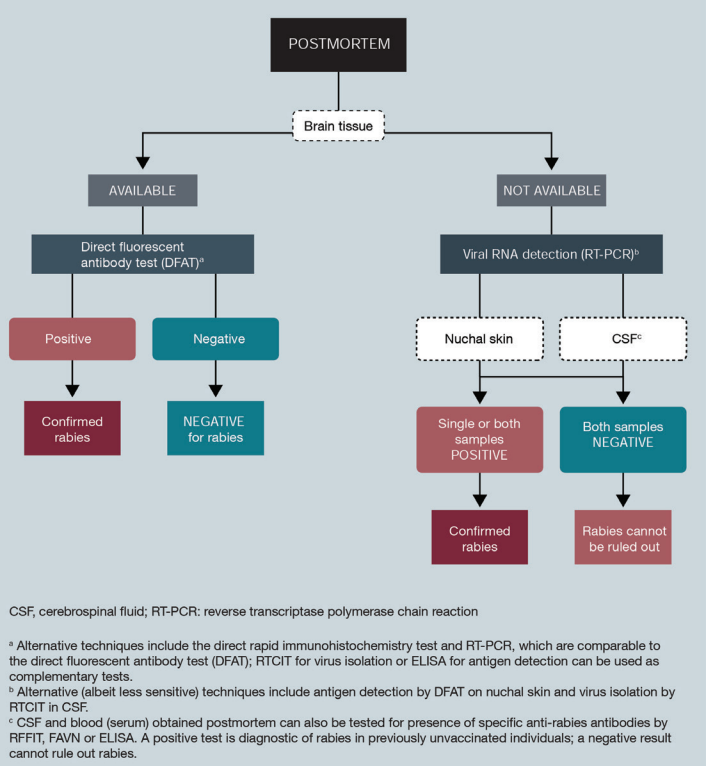


Figure 16 - World Health Organization (2018). Laboratory techniques in rabies, volume 1, 5th ed. World Health Organization. https://apps.who.int/iris/handle/10665/310836 - Fig. 5.2. Algorithm for human rabies postmortem diagnosis

Table 11: Comparing the Laboratory techniques used for Diagnosis of Rabies in Post Mortem Examination

	TEST	SAMPLE	Validity of the test
1	Fluorescent antibody technique (FAT)	Fresh brain smears	Gold standard
2	PCR	Brain tissue	Comparable to the FAT
3	Histological identification of inclusion bodies ('Negri bodies') by Seller's technique.	Fresh brain smears	Can be useful as a complementary test but is not recommended by WHO for primary diagnosis, since a negative result cannot rule out rabies.
4	Histological identification of inclusion bodies ('Negri bodies') by haematoxylin and eosin (H&E) staining	Sections of formalin-fixed, paraffin-embedded brain tissues	

3.6 PACKAGING AND TRANSPORT

- All samples should be considered potentially infectious.
- All specimens should be collected in a primary container that is watertight and leak-proof and must be securely sealed (tape around the cap will ensure that the containers do not open during transit).
- The primary container should be put in a secondary container such as a zip-lock plastic bag with insulating material between primary and secondary containers.
- The secondary container should be put into a rigid outer packaging box during transport, in accordance with national and International Air Transport Association (IATA) guidelines as 'category B' necessitating UN 3373/650 packaging (only RABV cultures are considered 'category A').
- Nuchal samples are best shipped frozen but can be shipped simply with ice packs.
- Saliva samples should be shipped frozen.
- Brain samples can be frozen or preserved in 50% glycerol–saline solution if freezing is not readily available.
- Samples should never be preserved in formalin.
- Please ensure maintenance of cold chain (2-8°C) while the sample is being transported.
- Samples may be sent on filter paper at ambient temperature for easier shipment. Filter paper such as FTA also has the advantage of inactivating RABV, reducing the hazard and facilitating shipment while preserving nucleic acids.
- If immediate transport is not possible, samples should be stored frozen at -20 °C or below.
- The reference laboratory must be contacted before the shipment of samples with suspected RABV.
- Sampling and shipping procedures must be well-established and communicated effectively to laboratory staff before they have to be put into use.

3.7 RABIES ANTIBODY TITER ESTIMATION

A rabies antibody titre is essentially an estimation of an immune response against rabies virus (either through exposure or vaccination). The ELISA is one method which provides a laboratory measurement of the ability of an individual human or animal serum sample to neutralize rabies virus.

As Rabies vaccine has proven potency, rabies antibody titration is not recommended routinely. However, the clinician may recommend the anti-rabies antibody titre estimation in following situations

- if any significant deviation from the vaccination schedule,
- deviation in the route or dose recommended for vaccination,
- immunocompromised patients receiving PEP
- probability of repeated occupational exposures

Humoral antibodies play an important role in protection against rabies. Anti-rabies neutralizing antibody titre of 0.5 IU/ml or more in serum is considered as protective. This level is achieved in most healthy individuals by day 14 of a post-exposure regimen, with or without simultaneous administration of rabies immunoglobulin.

3.8 MANAGEMENT OF PATIENTS WITH RABIES

Although rabies is almost always fatal, health care providers still have an essential role to play in providing prompt, effective, holistic, compassionate, culturally sensitive case management. This can be done even with extremely limited equipment and drugs. In view of the inevitability of death in most cases, treatment should be focused on palliative care, with heavy sedation (barbiturates, morphine) and avoidance of intubation or life-support measures, especially once the diagnosis is certain.

In a disease as agonizing and terrifying as rabies encephalomyelitis, alleviation of distressing symptoms is the primary concern and overriding responsibility of medical staff. However, in many clinics and hospitals across rabies endemic areas of the world, patients suspected of having rabies are deemed to be untreatable. They are either sent home without advice or drugs or are isolated and sometimes abandoned in a remote part of the health facility and denied any medical attention. These practices ignore the fundamental precept that a doctor's responsibility is to relieve suffering even if there is no expectation of cure.

3.8.1 Palliative care

Compassionate care to minimize the suffering of the patient is the key for palliative care.

To avoid provoking spasms on account of hydrophobia or aerophobia, calm, quiet environment, ideally in a dimly-lit, draught-free, single-bedded room, should be created. Restraining the patient in bed can be attempted initially with loose and comfortable ties and cot-sides, and ultimately by adequate sedation. Relatives must be able to communicate with the dying patient with dignity, safety and privacy, according to their cultural and religious traditions. Other visitors should be restricted, including hospital staff not directly involved in management. However, frequent monitoring is needed so that patients can be given adequate supportive treatment.

- **Thirst/Dehydration**

Hydrophobic patients cannot tolerate drinking, while those with paralytic rabies often cannot swallow. As a result, these patients may become dehydrated and desperately thirsty. Some may be able to eat fruit such as bananas and suck citrus fruits to combat thirst, and their lips and tongue may be moistened with a damp sponge or flannel. Treatment demands a secure intravenous (iv) line, ideally a catheter rather than a needle. The IV site should be immobilized by splinting. Isotonic 5% glucose, 0.9% saline, or Hartmann's (Ringer's lactate) solution (of sodium chloride, sodium lactate, potassium chloride, and calcium chloride) can be used as appropriate. Other possible routes for parenteral rehydration, depending upon available skills and equipment, include intraperitoneal, intraosseous, subcutaneous (SC), or intrarectal.

- **Fever**

Since physical methods such as tepid sponging and fanning are intolerable to most patients with furious rabies, antipyretic drugs are necessary to control fever. Aspirin, ibuprofen or diclofenac, and paracetamol (acetaminophen) can be given by non-oral routes, such as IV, IM, or intrarectal (Table 12). Many patients have evidence of a generalized inflammatory response (e.g. peripheral neutrophil leucocytosis) as a cause for fever. However, when the fever is central (neurogenic) in origin, antipyretics may be ineffective. Drugs that have proved effective in individual cases of central hyperthermia include baclofen, bromocriptine, amantadine, dantrolene, and propranolol, but these are unlikely to be widely available in developing countries. Anxiety, Fear, Restlessness, Agitation, Seizures—Use of sedatives and tranquillizers; benzodiazepines are drugs of choice as they are widely used in daily clinical practice in most places and can be administered by various routes (Table 12). Diazepam can be given in the same doses IV/IM or intrarectally.

Although rabies is a fatal condition, it is important to avoid depressing respiration by giving the diazepam too rapidly by IV injection. Diazepam will alleviate the patient's suffering while giving the family time to adjust and consider the possibility of taking them home to die if that is their personal or cultural preference.

Midazolam, an alternative benzodiazepine, has a much shorter half-life. When given IM, SC, or IV, it should be 'titrated' against the patient's clinical condition, which must be assessed frequently. Small doses are injected IM at frequent intervals or by continuous IV infusion using an electric syringe.

Hypersecretion (Salivation, Lacrimation, Sweating) This may be reduced by anti-muscarinic anticholinergic drugs, such as hyoscine (scopolamine) hydrobromide, that block parasympathetic secretory activity.

Pain: There is a role for opioids and other powerful analgesics, when they are available, to relieve pain and suffering in rabies victims. Morphine can be given IV, SC, IM, or intrarectally, and Fentanyl transdermally by patch, which may be especially valuable for terminal management of patients after they have returned home. As the infection progresses, coma and respiratory, cardiovascular, neurological, endocrine, or gastrointestinal complications will eventually ensue. When the diagnosis is clear, palliative care is the only compassionate strategy for treating previously unvaccinated patients infected by dogs or other terrestrial mammals.

Table 12: Drugs for palliative care of rabies patients – published in Warrell M, Warrell DA, Tarantola A. The Imperative of Palliation in the Management of Rabies Encephalomyelitis. Trop Med Infect Dis. 2017 Oct 4;2(4):52. doi: 10.3390/tropicalmed2040052

Table 12
Drugs for the palliative management of patients with confirmed or strongly suspected rabies encephalomyelitis that are included in the WHO Model List of Essential Medicines 20th List (March 2017) and WHO Model List of Essential Medicines for Children 6th List (March 2017). http://www.who.int/medicines/publications/essentialmedicines/en/ Recommended doses are taken from https://www.bnf.org/products/bnf-online/ and https://bnfc.nice.org.uk/.

Indication	Drug	Route of administration	Dose: adult	Dose: paediatric
Fever	paracetamol	iv infusion over 15 minutes intrarectal	1 g every 4–6 h, maximum 4 g/24 h 1 g every 4–6 h, maximum 4 g/24 h	125–500 mg every 4–6 h
	ibuprofen	intrarectal	300–400 mg 6–8 hrly	
	aspirin	intrarectal	450–900 mg 4 hrly, maximum 3.6 g/day	
Anxiety, agitation, seizures	diazepam	iv (slow! caution!) im (painful!) intrarectal	10 mg in 3–5 minutes, repeated 1–4 hrly 20 mg 2 hrly 10mg 1–4 hrly	0.1–0.3 mg/kg in 3–5 min, repeated 1–4 hrly to provide 2.4–12 mg/kg/24 h 0.1–0.3 mg/kg 1–4 hrly 0.1–0.3 mg/kg 1–4 hrly
	lorazepam	im or slow iv injection into large vein (slow! caution!)	25–50 microg/kg 6 hrly	25–50 microg/kg 6 hrly
	midazolam	im iv or sc injection sc infusion intrarectal	0.08 – 0.2 mg/kg repeated 1–4 hrly 2.5 mg hrly 10–30 mg over 24 h by pump	0.07–0.1 mg/kg repeated 1–4 hrly 300–500 microg 1–4 hrly
Anxiety, agitation	haloperidol	im or sc injection iv or sc infusion	5 mg hourly until calm, then 4 or 6 hrly and when necessary 5–15 mg/24 h	age 1 month–12 y: 25–85 microg/kg/24 h 12–18 y: 1.5–5 mg/24 h
	chlorpromazine	deep im intrarectal	25–50 mg/6–8 hrly 100 mg/6–8 hrly	500 microg/kg 6–8 hrly
Hyper-secretion	hyoscine (scopolamine) hydrobromide	sc or iv injection sc infusion	400 microg 4 hrly 1.2–2 mg/24 h	10 microg/kg 4–8 hrly 40–60 microg/kg/24 h
Pain	morphine	slow iv, sc or im intrarectal	10 mg 4 hrly 15–30 mg 4 hrly	100 microg/kg
	fentanyl	transdermal patch	12–25 microg/h every 72 h	12 microg/h every 72 h

3.9 RECOMMENDATIONS FOR HEALTH CARE PERSONNEL AND FAMILY MEMBERS OF PATIENTS WITH RABIES

Most patients with rabies die, and families that seek care should be informed and counselled to receive the news of the patient's impending death. Care of people in whom rabies is diagnosed may cause anxiety among medical and nursing staff, relatives and friends providing non-medical care and, in the media, and the public. Human rabies does not pose a risk to health care staff if routine precautions are taken, especially during intubation and suctioning.

The staff managing hydrophobia cases need to know that the rabies virus is not carried in the blood and is only intermittently shed in saliva, CNS fluid, urine and within some tissues. Health care workers and relatives coming in contact with the patient should be reminded of the importance of adhering to barrier nursing and wear proper personal protective equipment (PPE), including a gown, gloves, mask and goggles. PEP/PrEP should be provided for health care personnel considered to be at risk, after careful assessment. Hospitals that are likely to receive rabies patients can consider PrEP for health care staff who may be involved in their management (see section 2.17 Pre-Exposure Prophylaxis).

PEP may sometimes be necessary for the partners of patients, as close contact and sexual intercourse in the early stages of the disease pose a hypothetical risk for transmission (infectious RABV is present in saliva); however, no reports have established human-to-human transmission.

3.9.1 Management of the bodies of patients who have died of rabies

- The body of a patient suspected to have died of rabies should be labelled as 'Infectious' but not as "contagious" (no airborne or droplet transmission).
- The risk of transmission to others is extremely low if standard precautions are observed. Blood does not contain RABV, but the virus is present in many other tissues and fluids, such as those of the central nervous system and salivary glands.
- Tissues and body fluids should be disposed of in the same manner as practiced for other infectious diseases such as tuberculosis and hepatitis.
- Disinfect the instruments used by autoclave or boiling after use.
- Discourage embalming.
- If embalming or autopsy is performed, it should be undertaken carefully, with appropriate precautions and personal protective equipment. Tissues and body fluids should be disposed of in the same manner as for other infectious diseases.
- The body of the deceased should be allowed to be buried or cremated, depending on their religious practice. Early disposal of human remains by burial or cremation is highly recommended.
- If the conditions permit and death has occurred in a health facility/hospital where lab facilities for taking brain sample is available then efforts should be made to collect the sample as per the standard protocols with strict infection control measures using proper personal protect equipment (PEP), and laboratory result should be communicated to the concerned authority.

3.10 Transmission Via Organ Transplantation

RABV is present in many tissues in the terminal stages of the disease, and caution should be exercised before transplanting organs from people who have died with neurological symptoms and signs of rabies. Several cases of rabies due to organ and tissue transplantation have been documented. Testing for common or highly fatal infections should be balanced against the urgency of transplanting a viable organ. Corneal transplantation should not be performed without ruling out whether the deceased could have died from rabies.

POINTS TO REMEMBER

1. Often the diagnosis of rabies is based on the clinical manifestations and a history of exposure to a rabid animal, however, clinical diagnosis may be difficult in cases of paralytic rabies and atypical presentations. For a definite, reliable diagnosis thus, rabies laboratory confirmation is necessary and must be done whenever feasible.
2. Biosafety measures need to be implemented when taking samples, shipping or working in the laboratory.
3. Ante mortem testing that has the highest diagnostic sensitivity requires at least three saliva samples, taken at intervals of 3–6 h, and skin biopsies (including hair follicles).
4. Gold standard for laboratory confirmation of rabies is viral antigen detection in brain tissue obtained post-mortem using the fluorescent antibody technique (FAT).
5. Hospital care for patients with clinical rabies is advisable, when possible, in order to reduce their suffering and ensure that they receive adequate, respectful palliative care.
6. PEP/PrEP should be provided for health care personnel considered to be at risk.
7. As RABV is present in many tissues in the terminal stages of the disease, caution should be exercised before organ transplantation from people who have died with neurological symptoms and signs of rabies.

SESSION 4 - RECORDING, REPORTING AND SURVEILLANCE

Learning objectives

- To understand the mechanism of Surveillance of Animal bite cases and Human rabies cases
- To understand the roles and responsibilities of Health workers and Medical officers
- To understand data analysis and its use for the prevention and control of rabies in the community

4.1 SURVEILLANCE

Surveillance is an essential and integral part of any national programme as it provides the evidence base for policy and strategy development. Effective control and elimination of disease require effective data collection and reporting. In short, surveillance is the systematic on-going collection of information for public health action. Recording& reporting each and every case of Animal bite and Rabies occurring in the community is critical.

Rabies surveillance aims to establish quality data on disease burden in humans as well as animals (to identify populations at risk and to implement necessary measures. Awareness and vigilance among health professionals is necessary to establish effective surveillance.

4.1.1 Surveillance under NRCP

The existing mechanism of reporting animal bites and human rabies cases by IDSP/ IHIP mechanism will be used for surveillance under NRCP reporting. Program-specific additional information required will be collected through NRCP monthly reports from health facilities/ District/State).

Surveillance under NRCP has two components

A. Surveillance of Animal Bite-Dog Bite and Animal Bite-Other cases

B. Surveillance of Human Rabies Cases

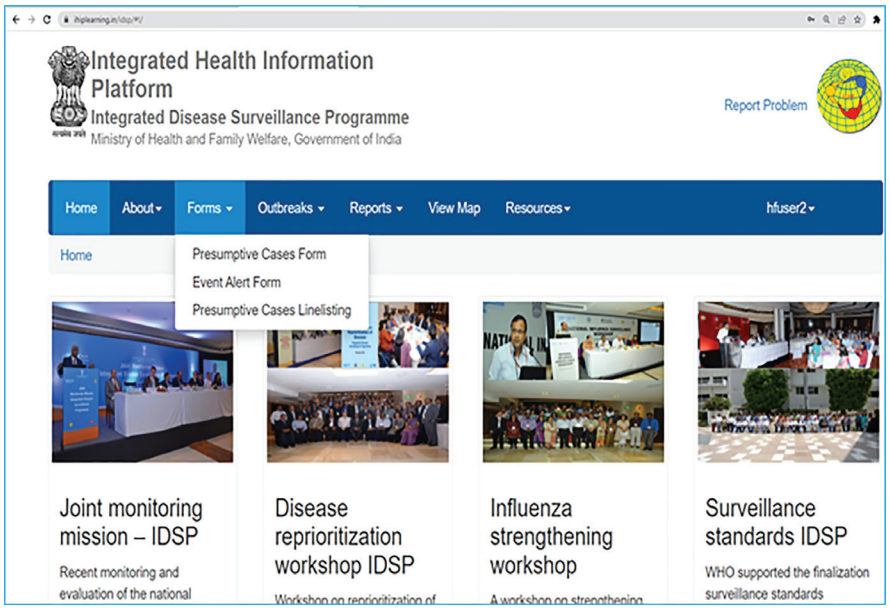
4.1.2 Surveillance of Dog bite/ Animal Bite cases:

A. Surveillance through IDSP/IHIP:

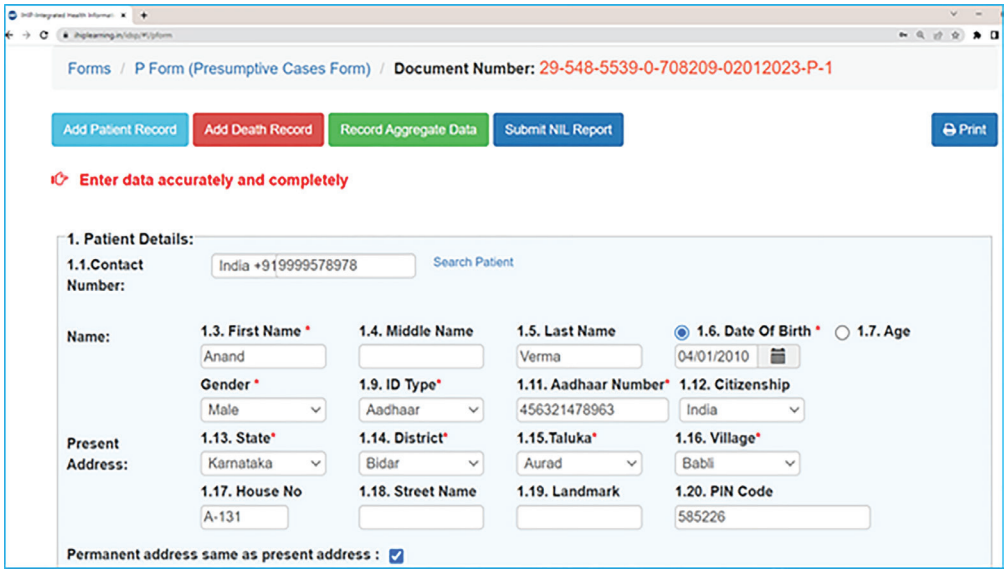
Following health conditions relevant to National Rabies Control Program are to be reported through IHIP portal

A. Reporting of Dog Bite & Animal Bite Others Case through S form of IHIP portal:

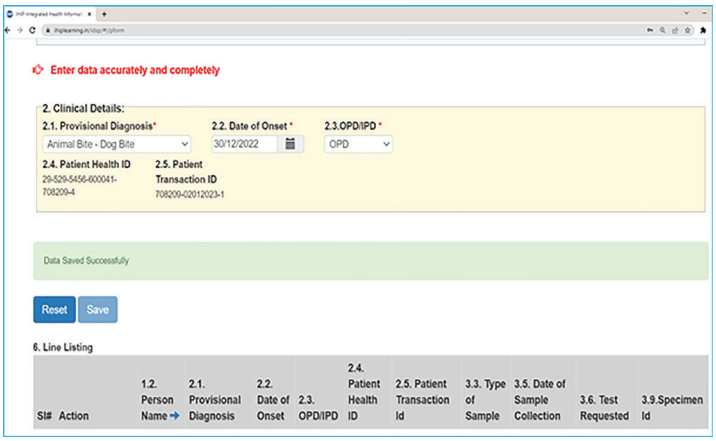
- After Log in, select presumptive case form

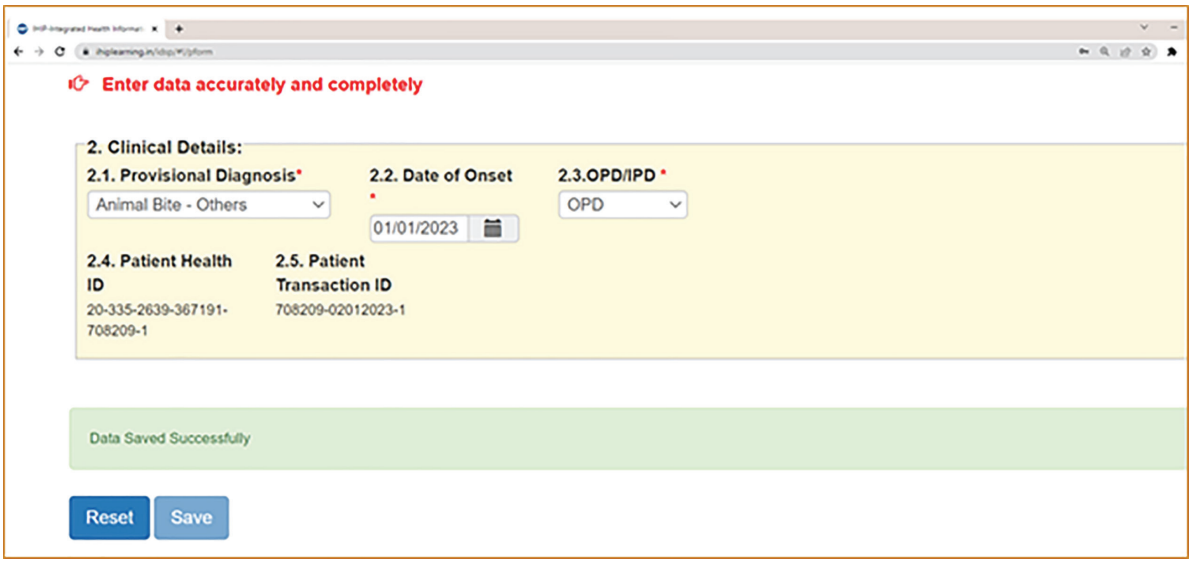


- Enter patient details.



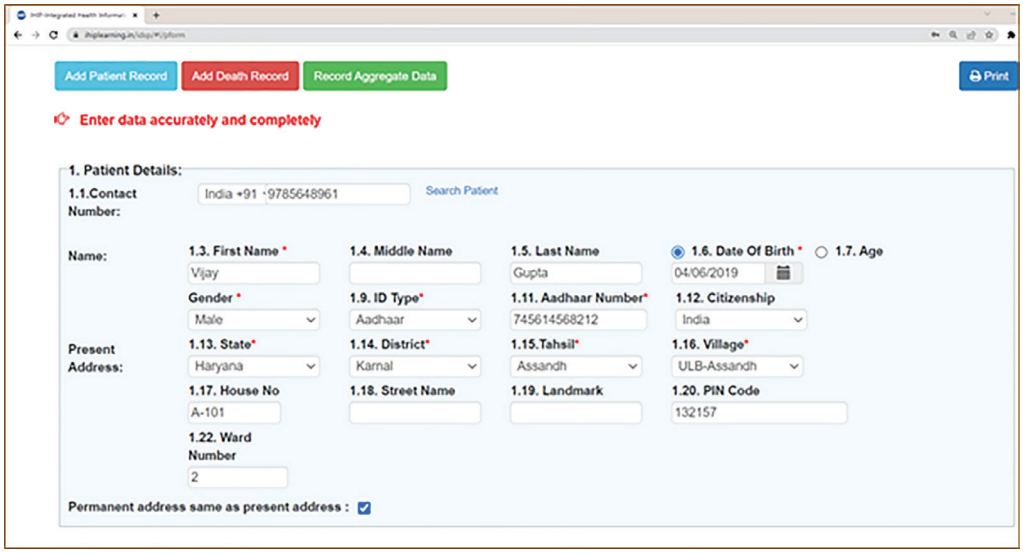
- Select provisional diagnosis Animal Bite- Dog/ Animal Bite Others as per the case



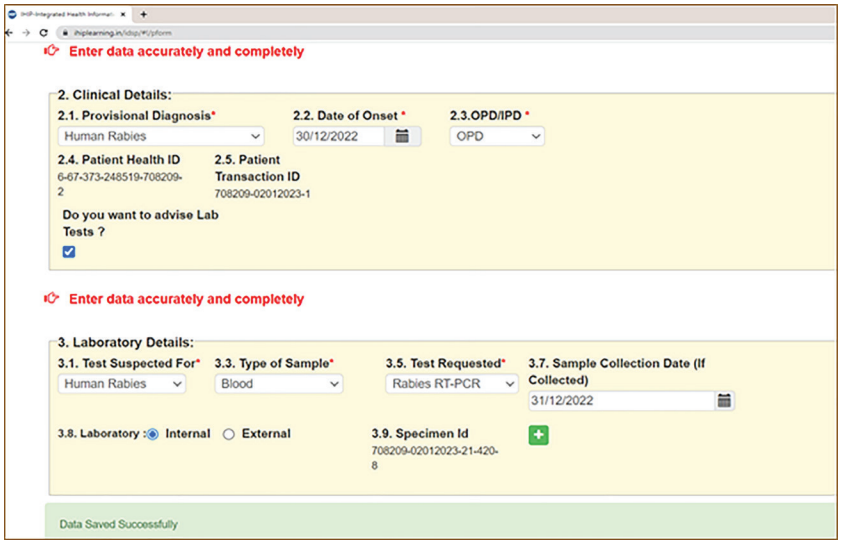


B. Reporting of Suspected Human Rabies Case P form of IHIP portal and reporting of Laboratory Confirmed Human Rabies Case L form of IHIP portal

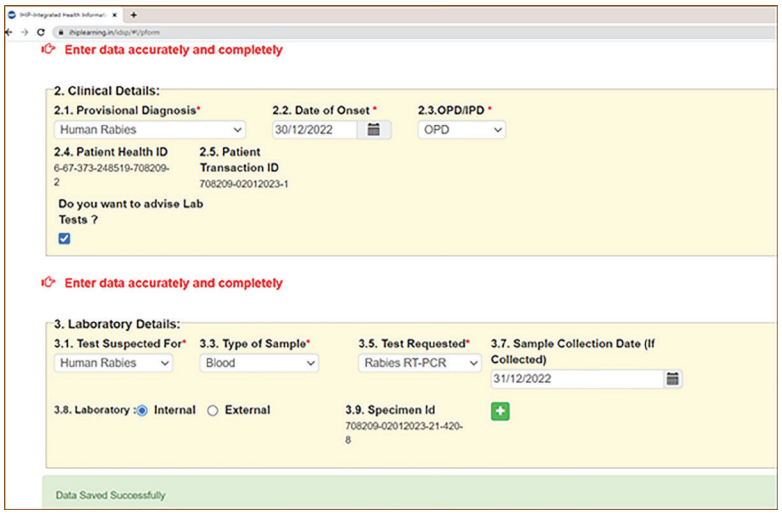
- After Log in, select presumptive case form



- Enter patient details.



- Enter Clinical details. Select Provisional Diagnosis
- In case of laboratory confirmed cases, enter laboratory details, appropriate test and then save



To bring uniformity standard case definitions with respect to suspected, probable & confirmed Human Rabies cases has been developed as under.

4.2 HUMAN RABIES CASES

4.2.1 Surveillance of Human Rabies Cases:

A person with a history of rabid dog /animal bite with symptoms as described in the rabies case definitions must be reported as appropriate as suspected/probable/confirmed Human Rabies Case

Wherever available, the details of such cases should be shared in a line list– Name, Age, Gender, Address

Case definitions

The standard case definitions for reporting Human rabies cases are formulated as under:

Clinical case definition: a person presenting with an acute neurological syndrome (i.e. encephalitis) dominated by forms of hyperactivity (furious rabies) or a paralytic syndrome (paralytic rabies) that progresses towards coma and death, usually due to cardiac or respiratory failure, typically within 7–10 days of the first sign if no intensive care is instituted.

The syndrome may include any of the following signs: aerophobia, hydrophobia, paranaesthesia or localized pain, dysphagia, localized weakness, nausea or vomiting.

Suspect Case (To be reported in S Form by Health Worker): Death of a human with history of dog bite few weeks/months preceding death.

Probable Case (To be reported in P form by Medical Officers/Doctors): A suspected human case plus history of exposure[#] to a (suspect[¥] / probable[€]) rabid animal

[#]Exposure is usually defined as a bite or scratch from a rabies-susceptible animal (usually dogs). It could also be lick exposure to open wounds, abrasion, mucous membranes of the patient.

[¥]**A suspect rabid animal** is a rabies-susceptible animal (usually dogs) which presents with any of the following signs at the time of exposure or within 10 days following exposure: unprovoked aggression (biting people or animals or inanimate objects), hypersalivation, paralysis, lethargy, abnormal vocalization, or diurnal activity of nocturnal species. Whenever the history of mentioned signs cannot be elicited, the history of exposure to a rabies-susceptible animal would be considered adequate.

[€]**A probable rabid animal** is a suspect rabid animal (as defined above) with additional history of a bite by another suspect / probable rabid animal and/or is a suspect rabid animal that is killed, died or disappeared within 4-5 days of observing illness signs.

Laboratory Confirmed case (to be reported in L-form by Laboratories having confirmatory test facilities for rabies): A suspect or a probable human case that is laboratory-confirmed$.

Laboratory confirmation by one or more of the following:

Detection of rabies viral antigens by direct fluorescent antibody test (FAT) or by ELISA in clinical specimens, preferably brain tissue (collected post mortem)

or

Detection by FAT on skin biopsy (ante mortem).

or

FAT positive after inoculation of brain tissue, saliva or CSF in cell culture, or after intracerebral inoculation in mice or suckling mice.

or

The detectable rabies-neutralizing antibody titre in the serum or the CSF of an unvaccinated person.

or

Detection of viral nucleic acids by PCR on tissue collected post mortem or intra vitam in a clinical specimen (brain tissue or skin, cornea, urine or saliva).

The details of Suspected/ Probable/ Confirmed cases should be shared in an NRCP line list format to the district, state and national Nodal officers.

All the suspected/Probable / confirmed human Rabies cases must be epidemiologically investigated as per standard format & accordingly necessary public health actions to be undertaken.

Remember that a patient attending an animal bite clinic for PEP is not to be labelled as a Human Rabies case. Only a patient which fits into clinical/suspected/probable/confirmed laboratory case definition is to be labelled as suspected/probable/laboratory confirmed human rabies case and reported accordingly.

Surveillance through NRCP Programme:

When people visit the health centre for treatment of Animal/Dog bites and information is collected through different registers. Every facility providing Rabies post-exposure prophylaxis must have an animal bite register. Reporting under NRCP is only facility-based reporting which are compiled and filled in monthly formats of NRCP. It contains information on animal bites, rabies cases, ARV/ARS status, route of administration etc.

4.3 RECORDING & REPORTING SYSTEM UNDER NRCP

Following Recordings and reporting formats should be available at the Animal Bite Management facility:

1. Animal bite exposure register (Annexure-3)
2. Rabies vaccination card/rabies treatment card in duplicate (one for the bite victim and another for ARC record) (Annexure-4)
3. Line List format of suspected/probable/confirmed case of Human Rabies (Annexure-6)
4. Monthly reporting format of animal bites for Health Facility (Annexure-8)

Table: 13: Data requirements under IHIP/IDSP/NRCP

Data elements	IDSP-IHIP	NRCP
Animal bite cases	Person, Place & time details of • Dog bite • Animal Bites	Aggregate information of • All animal bites, Category 1, 2 and 3 Health facility monthly summary report
Rabies cases	Suspected/probable/confirmed rabies cases line list	NRCP monthly format Line list of rabies cases
ARV, ID & IM doses given	NA	Health facility monthly summary report
ARS, Number of patients who received	NA	Health facility monthly summary report
ARV stock	NA	Health facility monthly summary report
ARS stock	NA	Health facility monthly summary report
Data sharing with veterinary officers	NA	Health facility monthly summary report
Clustering of animal bite cases	Event alert form	Health facility monthly summary report
Frequency	Realtime basis	Monthly basis

4.3.1 Animal Bite Exposure Register (Annexure 3)

- Every Animal Bite victim attending the health facility should be provided requisite animal bite management and post-exposure prophylaxis as per National Guidelines.
- All the information of the patient attending the Anti rabies Clinic should be noted down in the Animal bite register by ANM /Nursing staff and should be verified by the concerned medical officer.
- Animal bite exposure format also contains a monthly summary table that needs to be shared with the NRCP District Nodal officer which summarizes the information from the animal bite register about the cases reported in that month.
- If Rabies PEP is being administered at different locations in the same health facility (e.g. OPD & Emergency room/casualty) a separate register may be maintained at each location for an operational reason, but it is the responsibility of the Nodal officer that a single monthly report including information from all the registers at the same facility is compiled.

4.3.2 Information required to complete the animal bite register:

* Patients Details: Name, Age, Sex, Contact Details, Address

* Type of patient (New/Old)

- If the patient visits the facility for the first dose (day 0) of ARV then that patient will be labelled as "new"
- If the patient is visiting for follow up doses (Day 3, Day 7, Day 14 or Day 28) he/or she will be labelled as an "old" patient.

* Animal bite Exposure History:

- Date of Animal Bite,
- Site of Bite on Body (Extremities/Trunk/ Head-Neck Face/ Back)
- Biting Animal Species -dog/cat/monkey/others: specify

* Bite Details:

- Category of Bite I/II/II as described above
- Address where the bite took place to understand the clustering of cases.

* Previous History of ARV Vaccination (Complete/partial/NA)

- This information required to determine the vaccine schedule in the current episode. If a history of Complete post-exposure prophylaxis by modern vaccines is elicited then accordingly the regimen of Rabies vaccine needs to be changed.
- If there is no history or incomplete PEP then there is no change in the regimen of the Rabies vaccine.
- RIG administration decision also to be taken based on the previous history of PEP.

* Details of Post Exposure prophylaxis:

- information about Adequate Washing of Bite wound Done (Y/N),
- Rabies immunoglobulin Give (yes/no/NA),
- Route of Rabies vaccine administration (ID/IM),
- Brand of Vaccine,

* Summary: At the end of every page there is a summary table which summarizes the following information

- Category wise number of patients (old & new) attended Anti Rabies Clinics
- Summary of Route of administration (ID/IM)
- Total Number of Cat III patients receiving RIG

4.3.3 Rabies Post-Exposure Treatment Card- Annexure 4

(to be retained at Anti Rabies Clinic)

- Each animal bite victim needs to be provided with a rabies post-exposure treatment card and one copy of it needs to be retained at Anti Rabies Clinic. It is a vital document that can be used by health workers for assessing the completion and dropout rates of animal bite victims from PEP.

- The treatment card contains information as described in the Animal bite register
- In addition to the information in the animal bite register, it also contains the schedule of Rabies vaccines doses that needs to be administered.
- The treatment card will help the patient to know the dosage schedule. It will also be the record for a future course.
- A copy of the Treatment card to be retained at the health facility will help the facility to finalize the monthly report on completion of PEP.

4.3.4 Line List format of suspected/probable/confirmed cases of Human Rabies

- A health facility where suspected/probable/confirmed cases of human rabies are identified needs to report preliminary information of suspected/probable/confirmed cases of human Rabies to the District, State & National level in a real-time basis by email.
- The NRCP line list format should be submitted with a monthly report. A nil report also needs to be submitted.
- The line list format requires the following information
  - Patients Details: Name, Age, Sex, Contact Details, Address
  - Information about Biting Animal (Species)
  - Type of case whether suspected/probable/confirmed human rabies case
  - Address of place where bite incidence took place
  - Exposure History: Category of Bite, Status of PEP (Complete/ Partial/ Nil/NA)
  - Name of the health facility reporting the rabies case
  - The outcome of the patient at the time of reporting (Death in Hospital/ LAMA/ Alive)

4.3.5 NRCP Monthly Reporting

- Under National Rabies Control Programs, a monthly report of the summary of activities needs to be submitted by the following level
  - **Health Facility Monthly Report:** to be submitted by all health facilities which are providing Rabies Post Exposure Prophylaxis including PHCSs & Health & Wellness Centres. This also included a line list of suspected/probable/confirmed cases of human rabies. The health facility will submit its report to the NRCP Nodal officer of the Concerned District. Timely submission of this report is the responsibility of I/C of the Health facility by the 3rd day of every month. The format of the report is at Annexure 8.
  - **District level Monthly NRCP Report:** Office of District Nodal officer- NRCP will compile Health Facility monthly NRCP report submitted by all health facilities including Medical College in the concerned District's jurisdiction. This compiled report plus district level additional information will be submitted as District NRCP Monthly report. The District NRCP monthly report needs to be submitted to the state NRCP nodal officer on the 5th day of every month to the NRCP state Nodal officer. District Nodal officer NRCP will be responsible for the timely submission of this report. The format of the report is at Annexure 5.
  - **State Level Monthly NRCP report:** Office of State Nodal officer- NRCP will compile District Level monthly NRCP report submitted by all the districts in the concerned state's jurisdiction. This compiled report plus state-level additional information will be submitted as a State NRCP Monthly report. The State NRCP monthly report needs to be submitted to NPMU NRCP at NCDC on the 10th day of every month. State Nodal officer NRCP will be responsible for the timely submission of this report. The format of the report is at Annexure 7.
- Following information is required to complete a Monthly NRCP report at any level
  - Total no. of health facilities providing a facility for animal bite management/ number of Facilities having submitted the report

- o No. of patients as per Category of bite, Details of patients as per Route of vaccination, suspected/ probable/confirmed rabies cases/deaths reported,
- o Total Stock of Anti Rabies Vaccine (no. of vials) & stock used, total stock of ARS (no. of vials) & stock used in the reporting period,
- o Information on Rabies and Animal Bite cases shared with concerned veterinary Officer, any clustering of Animal Bite Cases observed? If yes write the details including locality, any other remarks.
- o Line List of suspected/probable/confirmed Rabies Cases/ Deaths also needs to be shared **Annexure 3.**

4.4 Role of Infectious Disease Hospitals/Medical Colleges

All the district hospitals/tertiary care hospitals/infectious disease hospitals/public medical colleges having inpatient facility for rabies cases should share the line list as per **Annexure 6** to District Nodal Officer/NRCP division (nrcp.ncdc@gmail.com)

Surveillance system for Animal bite and Rabies case reporting

IDSP/IHIP reporting – Under IDSP /IHIP, animal bite cases are reported through forms while rabies cases are reported under S, P & L forms of IDSP/IHIP portal

NRCP reporting- Reporting under NRCP is only facility-based reporting and information collected till PHC level through IDSP/IHIP need to be compiled and filled in monthly formats of NRCP. It contains information on animal bites, rabies cases, ARV/ARS status, route of administration etc.

Table: 14: Summary of the rabies reporting under IDSP/IHIP and NRCP

S. No	Level of reporting	Person responsible	Information to be reported	Format for reporting
1	Community	Health Worker/ ANM/ASHA	• Animal Bite – Dog bite • Animal Bite - Others	IDSP/IHIP S form (Annexure 5)
			• Clustering of animal bites	IHIP Event alert form (Annexure 13)
			• Deaths suspected due to rabies	IDSP/ IHIP S form (Annexure 5) Line list of Suspected Human Rabies Case.
2	Facility	Medical Officer I/C	• Number of Animal bites	IDSP weekly P form (Annexure 5)/IHIP portal (Annexure 14)
			• Number of Animal bites • Animal bites by category of bite • Number of ID/IM doses given • PEP completed patients • ARV and ARS stock & utilization • Information sharing with the veterinary officer • Clustering of animal bites	NRCP health facility monthly summary report (Annexure 8)
			• Number of clinically suspected rabies cases and deaths • Number of confirmed human rabies deaths	NRCP monthly line list of Suspected / Probable/ confirmed rabies cases (Annexure 8)

3	Lab	Facility I/C of all laboratories diagnosing rabies cases (Human	• Lab confirmed rabies cases	IDSP L form (others) (Annexure 5)/IHIP portal NRCP lab line list of confirmed rabies cases (Annexure 11)
		Identified NRCP laboratories	• Lab confirmed rabies cases	NRCP Monthly report on laboratory diagnosis of Rabies (Human/Animal) (Annexure 11)

Table 15: Summary Human Case Definitions and Corresponding Surveillance Activity for reporting

Case	Definition	Surveillance activity
Suspected	A case that is compatible with the clinical case definition: a person presenting with an acute neurological syndrome (i.e. Encephalitis) dominated by forms of hyperactivity (furious rabies) or a paralytic syndrome (paralytic rabies) that progresses towards coma and death, usually due to cardiac or respiratory failure, typically within 7–10 days of the first sign if no intensive care is instituted. The syndrome may include any of the following signs: aerophobia, hydrophobia, paraesthesia or localized pain, dysphagia, localized weakness, nausea or vomiting	Notify the appropriate local authorities according to national protocols. Collect appropriate samples from the patient according to national protocols. Conduct a verbal autopsy to collect a case history for the patient for further characterization.
Probable	A suspected case + a reliable history of contact with a suspected, probable or confirmed rabid animal.	Identify contacts of the patient and/or animal involved for follow-up.
Confirmed	A suspected or probable case that is confirmed in a laboratory	Systematically record the laboratory diagnosis and link it with verbal autopsy information. Notify the appropriate authorities of a confirmed human rabies case according to national protocols.

POINTS TO REMEMBER

1. Recording & reporting every case of Animal bite and Rabies occurring in the community is a very essential step for maintaining the surveillance of Animal bite and Rabies cases.
2. Recordings and reporting formats should be available at all health facilities providing Animal Bite Management (PHC/Anti Rabies Clinic/CHC/Sub-divisional hospital/District Hospital/Medical college etc.)
3. At the village and sub centre levels, AHSA and ANM need to report animal bite cases through the S form of IDSP/Event alert form under IHIP.
4. At PHC level/block level, animal bite and rabies cases are reported through monthly reporting forms under the NRCP as well as through P forms of IDSP.
5. At the District level, animal bite and rabies cases are reported through monthly reporting forms of NRCP as well as P forms of IDSP.
6. At the State level, animal bite and rabies cases are reported through monthly reporting forms of NRCP as well as P forms of IDSP.
7. Medical colleges and infectious disease hospitals/tertiary care hospitals having patient facilities for rabies case management should share the line list of the rabies cases with respective district nodal officers and NRCP Division at nrcp.ncdc@gmail.com.
8. At every level (sub-centre, PHC, District, State) coordination should be made with veterinary counterparts for rabies vaccination of dogs and dogs population management.
9. Recording & reporting every case of Animal bite and Rabies occurring in the community is a very essential step for maintaining the surveillance of Animal bite and Rabies cases.
10. Recordings and reporting formats should be available at all health facilities providing Animal Bite Management (PHC/Anti Rabies Clinic/CHC/Sub-divisional hospital/District Hospital/Medical college etc.)
11. At the village and sub centre levels, AHSA and ANM need to report animal bite cases through the S form of IDSP/Event alert form under IHIP.

SESSION 5 - LOGISTICS FOR RABIES BIOLOGICALS

Learning objectives

- To understand the principles of the logistic management of Rabies Biologicals
- To understand the principles of storage of Rabies Biologicals

5.1 Procurement of Rabies Biologicals At District/State Level

- The annual requirement of the Anti-Rabies Vaccine (ARV) & Anti-Rabies Serum (ARS) must be calculated in advance. Accordingly, the tender/ purchase order needs to be placed.
- The requirement must include 10% wastage factor and a buffer stock for three months (as lead time from order placement to actual delivery of vaccines).
- As per national guidelines, the preferred route of administration for the anti-rabies vaccine is Intradermal. It is cost-effective and requires very little quantity (0.2 ml/ visit/patient for intradermal route vs. 1 ml/visit/patient for intramuscular route).
- ARV and ARS are part of the essential drug list of the National Health Mission. Budget for ARV and ARS may be proposed under NHM PIP under national free drug initiative.
- Procurement of the ARV and ARS is decentralized as per state policy.
- Procurement of the ARV and ARS by the Government agencies through the Anti-Rabies Clinics (ARC) may be based on the number of animal bite cases with due consideration to be given to the available resources/budget and support from the state government National Free Drug Initiative of NHM and other sources.
- The number of patients with rabies exposures seeking anti-rabies vaccination per day cannot be predicted. The risk of rabies infection as a consequence should prevail over the wastage of the vaccine.

5.2 Calculation of Expected Demand of Rabies Vaccine & Rabies Immunoglobulin

No. of Rabies vaccine (Human) vials to be procured = Total number of animal bites reported in a year (as per ID regimen one vial is sufficient for one patient) + 10 % wastage + buffer stock for 3 months
No. of Rabies Immunoglobulin (RIG) vials to be procured = Total number of animal bites reported in a year x 0.50 (assuming 50 % of patients as under cat-III animal bites attending health facility) + 10 % wastage+ buffer stock for 3 months

To avoid wastage of vaccine, leftover ARV can be used for pre-exposure prophylaxis in high-risk groups.

5.3 Storage of Rabies Biological

Maintenance of the cold chain is of utmost importance to ensure that the potency of anti-rabies vaccines is retained. If great care is taken with aseptic technique, an appropriate dose of vaccine may be withdrawn from a vial and the remainder used for another patient, provided that the vial is kept cool and stored in a refrigerator at 2-8°C.

A sterile needle and syringe must be used to draw up vaccines for each patient to prevent cross-infection of hepatitis, HIV and other infections (open vial policy). Although the vaccine antigen is stable at 4°C, there is a high risk of contamination of multidose vials by microorganisms, especially as the ARV does not contain a preservative.

Reconstituted vaccines should be used as soon as possible and those without preservatives should be used within 6 hours if kept at 2-8°C. All unused reconstituted vaccines at the end of 6 hours must be discarded. To limit vaccine wastage, remaining vaccine in a vial could be used for PrEP and follow-up visits should be scheduled accordingly.

As per UIP-Adverse Event Following Immunization (AEFI) guidelines, it is advisable to store ARV and RIG in a separate refrigerator at 2°C-8°C. It is advisable to record the refrigerator temperature twice daily once in the morning and once in the evening.

Table 16: Health Facility wise Availability of Rabies Biologicals as per NHM Essential Medical List (EML)

Level	Rabies Vaccine (Human)	Rabies Immunoglobulin (RIG)
• Medical Colleges • Infectious Disease Hospital • District Hospitals • Secondary & tertiary Care Hospital	Mandatory/ Yes	Mandatory/ Yes
Community Health Centre	Mandatory/ Yes	Mandatory/ Yes
Primary Health Centre	Mandatory/ Yes	
Health & Wellness Centre	Mandatory/ Yes	

POINTS TO REMEMBER

- Provision of an uninterrupted supply of ARV/RIG is essential for protecting animal bite victims against deadly rabies disease.
- Procurement of the ARV and ARS (RIG) is to be done as per respective state policy.
- Funds are provided for procurement of ARV & RIG under budget head National health Missions Free Drug Initiative of NHM PIP
- ARV and RIG are included in the essential drug list under NHM and may be procured under the National Free Drug Services Initiatives of NHM.
- A decentralized purchase system by the state may be based on the number of animal bite cases attending the health facilities.
- Maintenance of cold chain and proper storage is of utmost importance to ensure that potency of Anti-Rabies vaccines is retained.

SESSION 6 - HEALTH FACILITIES AS ANTI-RABIES CLINICS (ARC)

Learning objectives

- To understand the concept of health facilities as Anti-Rabies Clinics.
- To understand requirements for running an Anti-Rabies Clinics.

In every district, assessment should be done by the District Nodal officer – NRCP from baseline information as under –

Information to be gathered includes:

- Total number of health facilities i.e PHCs / CHCs / sub-divisional hospitals / district hospitals having animal bite management facility
- Staff position and their training status on animal bite management
- Infrastructure / basic facilities available for management of Animal Bite Victims (ABV) and rabies cases
- Monthly Data of animal bite victims
- Availability of ARV, ERIG and lab facilities
- Name & Contact details of Hospitals admitting suspected rabies cases
- Need to establish new Anti-Rabies Clinics and laboratory facilities for rabies diagnostics

Based on the above information, appropriate logistics (recordings/reporting formats, guidelines), infrastructure (wound washing facility in health facility) and procurement of ARV&ARS should be done.

6.1 Wound Washing Area

Wound management is an important component of post exposure prophylaxis (PEP), but often ignored by the bite victims. Hence, establishing a dedicated wound washing area in health facilities is essential to support these efforts. This document provides guidance on the importance of wound washing, the rationale behind it, and recommendations for establishing such facilities in healthcare settings

Importance of wound washing for animal bite cases

Reducing the risk of rabies infection: Rabies is a deadly viral disease, transmitted through the saliva of infected animals, primarily following bites.

- Washing wounds with copious amounts of water is a vital step in the post-exposure prophylaxis for rabies. It helps in removing saliva containing the rabies virus from the wound site. The removal of the virus eliminates the risk of infection. Also, the use of soap by its lipolytic action inactivates the rabies virus.
- Wound washing also cleanses the dirt, reduces bacterial load and thus minimizing the chances of secondary infection.
- The National Rabies Control Programme (NRCP) recommends immediate wound washing with soap and water upto15 minutes and applying disinfectant to the wound/s to minimize the risk of rabies infection.

Guidance on establishing wound washing area

Requirements: To establish an effective wound washing area, the following aspects need to be considered:

1. **Location:** Identify an appropriate location within the healthcare facility, preferably near the emergency department, casualty, dressing room, or dedicated animal bite treatment area/ anti-rabies clinic (ARC). Avoid locating it adjacent to or in the toilets.
2. **Spacious room:** The area should have sufficient space (minimum 6x6 ft) to accommodate patients (often mother and child) and necessary fixtures, etc. It should be designed to promote infection control practices, including providing hand hygiene facilities and personal protective equipment (PPE).

3. **Water supply:** Continuous clean running tap water supply should be available for wound washing procedures. Adequate plumbing, drainage, and access to clean water are essential.
4. **Medical supplies:** Ensure there is a plinth or bench for proper wound management and attending medical procedures.
5. **Ventilation:** Ensure the area is well-ventilated (exhaust fan fitted), well lit, and easily accessible for patients and staff.
6. **Waste management:** Proper high-rise drainage (no stagnation) of water, and biomedical waste management should be followed as per standard protocol /guidelines.

	Hand washing sink with tap and wall fixed mirror; and a continuous supply of clean running tap water for washing wounds on head, neck, face and hands. A bottle of liquid soap shall be placed on the sink for use.
	A separate handheld spray with a pipe of 3-4 feet length shall be fixed on the wall and provided with soap (preferably liquid soap) for washing wounds on lower limb/s
	Antiseptic solutions for application after wound washing, such as povidone-iodine (preferable) or chlorhexidine should be provided.
	Disposable gloves, masks, gowns, and goggles or face shields for health care personnel.

Standard Operating Procedures (SOPs)

Step-by-step instructions for wound washing procedure:

1. Wash/flush all the wound/s immediately (or as soon as possible) under running water for up to 15 minutes.
2. Use soap to wash the wound/s.
3. After thorough washing and drying the wound with sterile gauze, apply a disinfectant such as povidone iodine or chlorhexidine.
4. Do not touch the wound with bare hands.
5. Wound washing procedure must be performed even if the patient reports late.
6. Application of irritants such as chili, soil, oils, turmeric, lime, salt, ash, plant juice, etc. by the patient is strictly prohibited
7. For further rabies prophylaxis like vaccine administration, rabies immunoglobulin infiltration, wound management, etc. refer to a medical officer/ nearest health facility.

Important: Cauterization of the wound/s with acids/ alkalis /flame/heat/etc is strictly prohibited.

Establishing a dedicated wound washing area for animal bite management, particularly for post-exposure prophylaxis against rabies, though simple, still a life saving measure for preventing rabies in the bite victim. By following the guidelines provided in this document, healthcare facilities can ensure the provision of prompt and effective wound care, improving patient outcomes and good public health.

6.2 Anti-Rabies Clinics (ARC)

Anti-Rabies Clinics / Centres are the health facilities manned by trained doctor/s and nurse/s where individuals with rabies exposure are evaluated and managed.

- Generally, PHCs / CHCs / sub-divisional hospitals / district hospitals having animal bite management facilities will act as Anti Rabies Clinics (ARC).
- Strengthening of existing and establishment of new ARCs based on community needs assessment is an important objective of the National Rabies Control Program.
- State Nodal Officers are advised to conduct mapping of existing district wise ARC in the Government Health facilities (PHC / CHC / district hospital or other tertiary level health institutes)
- State Nodal Officers are also advised to conduct mapping of all private health facilities having a facility to treat animal bite victims or rabies cases.
- The needs assessment for establishing new ARC at the identified health facilities may simultaneously be carried out by SNO.

Figure 17: Model Anti Rabies Clinic

POINTS TO REMEMBER

- Anti-Rabies Clinics / Centres are the health facilities manned by trained doctor/s and nurse/s where individuals with rabies exposure are evaluated and managed.
- In every district, needs assessment should be done by the District Nodal officer.
- Generally, PHCs / CHCs / sub-divisional hospitals / district hospitals having animal bite management facilities will act as Anti Rabies Clinics (ARC).
- Minimum requirements need to be met.

National Rabies Control Program encourages the concept of model ARCs that should meet the minimum requirements as presented in Table 16.

Table 16: Minimum Requirements to establish an ARC

A.	**Minimum available facilities at ARC**
1.	Management of Animal Bite Wounds: wound washing facility
2.	Availability of Rabies biologicals for post-exposure prophylaxis: Anti-rabies vaccine and ERIG
3.	Functional referral services for hydrophobia cases
4.	Standardized recording and reporting systems o Animal Bite register o Rabies Post-Exposure Treatment Cards o Stock Register o Monthly reporting formats
B.	**Minimum staffing pattern at ARC**
1.	One Physician } All trained in animal bite management and rabies Pre- and Post-Exposure Prophylaxis
2.	One Nurse (GNM)
3.	One Pharmacist
4.	Others
C.	**Minimum infrastructure**
1.	Visible signboards outside and at the entrance of the centre
2.	Visible organizational chart
3.	Time schedule (functional hours of ARC)
4.	Visible flow chart/algorithm of "decision to treat" (available at Annexure 7 of national guidelines of rabies prophylaxis Decision Tree: Guide to Post-Exposure Prophylaxis)
5.	Visible Information, Education & Communication (IEC) messages
6.	Separate wound washing facility with safe and clean water (preferably continuous tap water). If tap water is not available the water should be stored in a clean, covered bucket.
7.	Refrigerator with a calibrated thermometer, exclusive for vaccine/ RIG storage
8.	Vaccine carrier for temporary storage
9.	Facility for proper biomedical waste management with the availability of colour-coded waste bins and medical waste sharps disposal containers
10.	Weighing scale
D.	**Logistics**
1.	Equine Rabies Immunoglobulin
2.	Tissue culture anti-rabies vaccine approved by DCGI for ID/IM route.
3.	Consumables: self-mounted insulin syringes (AD), dressing kits, soap and gloves
4.	IV fluids and emergency drugs for adverse reaction

SESSION 7 – RISK COMMUNICATION

Learning objectives

- To describe the principles of risk communication for rabies
- To understand the principles for avoiding animal bites (Do's and Don'ts to avoid dog bites)

7.1 Risk Communication for Rabies

The goals of risk communication are to share information vital for saving a life, protecting health and minimizing harm to self and others; to change beliefs; and/or to change behaviour.

Risk communication assists stakeholders/departments and the public to understand the rationale for a risk-based decisions and to arrive at a balanced judgment that reflects the factual evidence about the matter at hand in relation to their interest and value, where risks are subjected to scientific and local cultural interpretations.

- Risk communication is a process of exchange of information and opinion among individuals, groups, and institutions (e.g. scientists, communities, media professionals) about the nature, magnitude, significance, and/or control of health risks.
- Risk communication includes a risk assessment of the disease and risk management.
- Risk communication should not be restricted to negative messages and warnings but should include positive 'educational messages.
- The stakeholders involved during risk communications are government institutions, private companies / industries, media, colleges, schools, professional organizations, watch groups, NGOs and the community.
- Risk communication should be targeted to
    - o General public
    - o Experts
    - o Media
- Mode of communications:
    - o Radio Announcements, Posters, Fact Sheets, Face-To-Face Talks, Publications, Email, Videos, Websites, Mobile Phone Messages, Social Media Campaigns, etc.
    - o Local radio, plays, rallies, street shows
    - o Using the rabies jingles and videos to play at schools, fairs, theatres.

7.2 Conducting Information, Education And Communication (IEC) Activities In The Community

7.2.1 Rabies Prevention through Information, Education and Communication

IEC is a process of working with individuals, communities and societies to develop communication strategies to promote positive behaviour which are appropriate to their settings and provide a supportive environment that will enable people to initiate and sustain positive behaviour (Behavior Change Communication).

Generating awareness is the key for rabies prevention, especially awareness about the disease, as ignorance and myths still prevail in the community and among stakeholders. It is essential to prevent rabies exposures and to encourage people to seek appropriate treatment post animal contact.

The population at risk is the population that is most likely to be exposed to rabies and should be the target of the rabies IECs, like

- Audio and videos on Rabies that have been developed by NCDC and are available on the website.

- Video jingles on Rabies that are available in the below listed languages via the link- https://ncdc.gov.in/index1.php?lang=1&level=2&sublinkid=302&lid=291
  - o General information: Hindi, English, Assamese, Bengali, Gujrati, Punjabi, Kannad, Kashmiri, Malayalam, Marathi, Oriya, Tamil, Telugu
  - o Do's & Don'ts: Hindi, English, Assamese, Bengali, Gujrati, Punjabi, Kannad, Kashmiri, Malayalam, Marathi, Oriya, Tamil, Telugu
- Audio jingle in Hindi is available via this link - https://ncdc.gov.in/index1.php?lang=1&level=2&sublinkid=300&lid=292

7.2.2 Target populations for IEC messages

Details about the gaps encountered in the different target populations and how to address them have been summarized in Table 17 below.

Table 17: Target Populations for IEC and measures to be taken

Sr No	Target Population		Knowledge Gap	Action Required
1	Medical Professionals	Administrators, Doctors, Nurses, Pharmacists.	Type of vaccines and RIGs, vaccination, ID route of ARV and RIG administration.	Training, CMEs, Workshops, Demonstrations, written material, Conferences
2	Veterinary Professionals	Administrators, Doctors, Veterinary Assistants, Catchers	Type of Vaccines, vaccination, Population Control and Skill Gap about Animal birth control operations.	Trainings, CMEs, Workshops, Demonstrations, Written material, Conferences
3	School Teachers	Teachers of Schools, Colleges	First Aid Instructions, Do's and Dont's, Bite prevention, Need for Treatment.	contacting heads of nearby schools or colleges and arranging Training, CMEs, Workshops, Demonstrations etc
4	Children	Children of all age groups. Parents of Children, Caretakers, Siblings	Playful and Curious in nature. Failure to report animal bite cases or any other kind of Exposure, bite prevention/animal behaviour	School health education, Plays, Quiz, Films, Cartoons
5	General Public	General Public, Occupational groups, Resident welfare associations (RWAs), Other organizations.	Ignorance, lack of seriousness of dog bites. Wrong beliefs, superstitions etc. Depending on hearsay information rather than health care experts	Posters/Flyers in public places such as bus stops, railway stations, zoos and parks Interactive sessions, Films, Documentaries, Short Plays, Rallies Announcements Farmer Fairs / Krishi Mela / Pashu Mela.
6	Exposed Persons	Bite Victims, Attendants of Bite Cases, and Persons with non-bite exposures.	Ignorance and Non-compliance to treatment. Fear of treatments	Posters, Flyers, One on One interaction with the care provider.

7.3 Myths Associated With Animal Bites And Rabies

In India, various cultural practices are followed after exposure to a dog bite, for example, application of soil, chilli paste, oil etc. Such common practices are unnecessary and cause further damages to the tissue. Many myths are associated with Rabies and these myths determine the way the individuals/ animal bite victims seek post-exposure treatment.

Myths about rabies and its treatment prevent people from seeking proper medical care and can cause harm. For example:

- Many people still believe that Post Exposure Prophylaxis consists of a series of painful injections in the stomach.
- There are many beliefs that witch doctors, herbal extracts, gemstones, a change in diet or religious practices can also prevent rabies
- Sometimes people believe that only one vaccination dose is sufficient.
- There are further misconceptions that dietary modifications or any other activities can reduce the effectiveness of the vaccine.

7.4 Tips to Prevent Dog Bites

Some of the following messages need to be communicated to the public about animal bites and rabies.

- Know the body language of dogs. Typical warning signs of unfriendly dogs are snarling or a stiff stance and staring, ears laid back, lip retraction, and fur-hair on back standing up.
- Train pet dogs not to bite and to obey simple commands such as sit, stay, come, and no.
- Don't play aggressive games like wrestling or tug-of-war with the pet dog.
- Do not stare at dogs or provoke any animal.
- Don't leave children unattended with dogs as most of the bite victims are children under 12.
- Talk to your children about avoiding strange dogs and growling dogs.
- Teach children not to take food and toys away from dogs.
- Do not disturb dogs that are nursing or sleeping.
- Dogs in pain tend to bite to protect themselves (be aware of dogs with wounds, don't inflict pain in dogs – e.g. kicking a dog)
- Don't run past a dog. They naturally love to chase and catch things. More attacks are seen with joggers and people who go out walking.
- If dogs are fighting don't try to intervene in their fight or saperate using hands. Maintain a safe distance from them.
- Senior citizens also have an increased risk of dog bites. It is more difficult for them to move away due to arthritis, weak muscles, and poor eyesight.
- Neuter pet dogs, as neutered dogs are less likely to bite.

POINTS TO REMEMBER

- Risk communication aims at sharing information vital for saving a life, protecting the health and minimizing harm to self and others; to change beliefs; and/or to change behaviour.
- Generating awareness is the key for rabies prevention, especially awareness about the disease, as ignorance and myths still prevail in the community and among stakeholders.
- Information, Education and Communication (IEC) material needs to target different populations with different knowledge gaps.
- Myths about rabies and its treatment still exist causing harm and preventing people from seeking proper medical care.
- It is important to raise awareness and educate communities on preventing dog bites.

SESSION 8 - RABIES IN ANIMALS

Learning objectives

- To describe the pathogenesis of rabies in animals
- To understand the clinical course of rabies in animals

Animal Rabies is a reportable disease in India as per the 'Prevention and Control of Infectious and Contagious Diseases in Animal Act, 2009'. Anyone who has reason to believe that an animal is infected with rabies or has been exposed to rabies should inform the local veterinary authority.

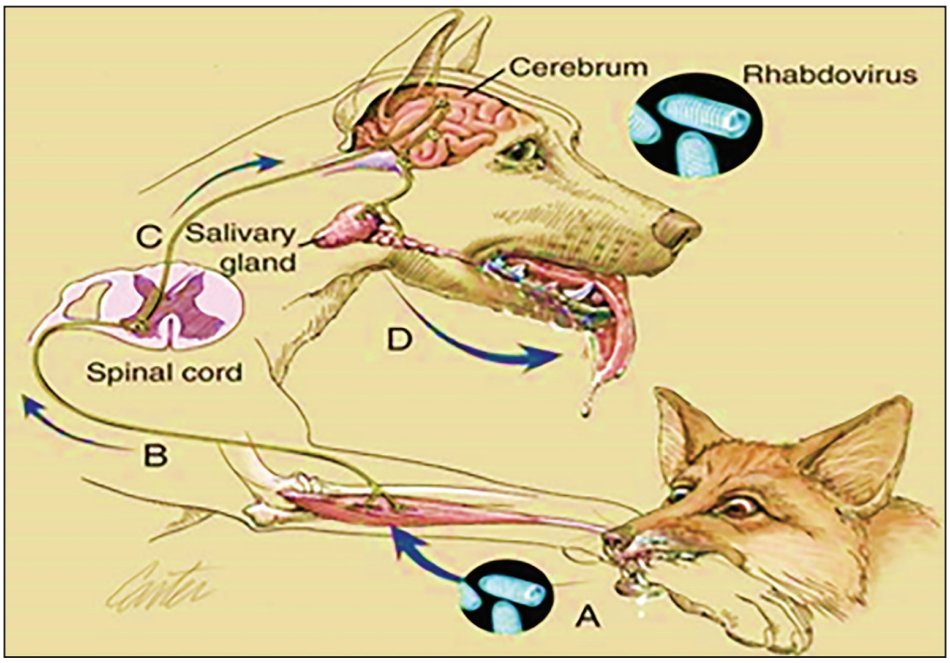


Figure 18: Pathogenesis of animal rabies

Dogs are the principal reservoir of rabies in the country. Rabies in other domestic animals like cattle, pigs, goats and horses has been reported since the 1930s, but were all traced back to the bite of a rabid dog. Control and elimination of rabies in dogs prevent rabies at its source.

The pathogenesis of rabies in animals is similar to that occurring in humans (Figure 18). The incubation period for rabies is highly variable depending on viruses, hosts and sites of entry, and the majority of infected animals will develop disease within six months of exposure.

The infective period for rabies virus is variable and can start before the onset of clinical signs. In dogs, cats and ferrets virus shedding can start up to ten days before the onset of the first clinical signs and last until death.

8.1 Symptoms of Rabies in Animals

It is an acute almost invariably fatal disease in warm blooded animals characterized by signs of abnormal behaviour, nervous disturbances such as motor nerve irritability, mania, an attacking complex, inability to swallow, excessive salivation, impairment of consciousness, progressive ascending paralysis and death due to respiratory paralysis.

Transmission

- The high concentration of rabies virus released from the salivary gland secretions before the onset of clinical signs of rabies .

- Virus in fresh saliva is transmitted via bite, scratch or abrasion by a rabid animal (rabid dogs shed virus in saliva 5-7 days before showing signs and cat does so for only 3 days before signs).
- Contamination of skin wounds by fresh saliva from infected animals.
- Aerosol transmission has been documented in the laboratory and in caves where bats inhabit (requires a high concentration of suspended viral particles).

8.2 Clinical Course of Rabies in Animals

The clinical course, particularly in dogs, can be divided into 3 phases: the prodromal, the excitative and the paralytic.

The term "furious rabies" refers to animals in which the excitative phase is predominant and "dumb or paralytic rabies" to those in which the excitative phase is extremely short or absent and the disease progresses quickly to the paralytic phase. Aerophobia and hydrophobia are not present in dog rabies

In any animal, the first sign is a change in behavior, which may be indistinguishable from a gastrointestinal disorder, injury, foreign body in the mouth, poisoning or an infectious disease. Temperature change is not significant and driveling may or may not be noted. Animals usually stop eating and drinking and may seek solitude. Frequently, the urogenital tract is irritated or stimulated as evidenced by frequent urination, erection in the male and sexual desire. After the prodromal period of 1-3 days, animals either show signs of paralysis or become vicious. Carnivores, pigs, and occasionally, horses and mules bite other animals or people at the slightest provocation. Cattle bite any moving object. The disease progresses rapidly after the onset of paralysis, and death is virtually certain within 10 days of the first signs. Rabid domestic cats attack suddenly, biting and scratching viciously. Rabid foxes frequently invade yards or even houses, attacking dogs and people. The rabid raccoon is characterized by its loss of fear of man, its frequent aggression and incoordination and its activity during the day, being predominantly a nocturnal animal. In urban areas, they often attack domestic dogs. Bats flying in the daytime are probably rabid.

Any other mammal that has bitten a human or is suspected of being rabid should also be reported to local public health officials, medical officers, municipal council and local veterinary authority.

SESSION 9 - UNDERSTANDING ONE HEALTH FOR RABIES

Learning objectives

- To understand the principles of the One Health approach for prevention and control of rabies
- To understand the main interventions in animals to prevent and control rabies

9.1 One Health Approach for Prevention and Control of Rabies

'One Health' is an approach to designing and implementing programmes, policies, legislation and research in which multiple sectors communicate and work together to achieve better public health outcomes. The areas of work in which a One Health approach is particularly relevant include food safety, the control of zoonoses (diseases that can spread between animals and humans, such as flu, rabies and Rift Valley Fever), and combatting antibiotic resistance (when bacteria change after being exposed to antibiotics and become more difficult to treat).

9.1.1 Why do we need a One Health approach?

Many of the same microbes infect animals and humans, as they share the eco-systems, they live in. Efforts by just one sector cannot prevent or eliminate the problem. For instance, rabies in humans is effectively prevented only by targeting the animal source of the virus (for example, by vaccinating dogs).

Figure 19: One Health Approach

9.1.2 One Health Definition

WHO's One Health High Level Expert Panel has recently published a holistic definition of One Health.

One Health is an integrated, unifying approach that aims to sustainably balance and optimize the health of people, animals and ecosystems.

It recognizes the health of humans, domestic and wild animals, plants, and the wider environment (including ecosystems) are closely linked and interdependent.

The approach mobilizes multiple sectors, disciplines and communities at varying levels of society to work together to foster well-being and tackle threats to health and ecosystems, while

addressing the collective need for clean water, energy and air, safe and nutritious food, taking action on climate change, and contributing to sustainable development.

9.1.3 Who makes the One Health approach work?

Many professionals with a range of expertise who are active in different sectors, such as public health, animal health and the environment, should join forces to support One Health approaches. To effectively detect, respond to, and prevent outbreaks of zoonoses, epidemiological data and laboratory information should be shared across sectors. Government officials, researchers and workers across sectors at the local, national, regional and global levels should implement joint responses to health threats.

To achieve this, the Department of Health & Family Welfare, Ministry of Health and Family Welfare, Govt. of India initiated a new scheme to be implemented in the 12th Five-year plan during 2012-13 to 2016-17 called as "Strengthening of Intersectoral coordination for prevention and control of zoonotic diseases".

Currently, the main stakeholders involved in rabies control viz. Health and Veterinary sectors are working in isolation with weak coordination mechanisms. All other sectors viz. Urban development, Education, Environment & Wildlife, Civic bodies, and more shall also extend cooperation and coordination for the control of rabies in the country with the help and support of the World Health Organization (WHO), OIE, FAO and Animal Welfare Organization. In the view of the 'One Health Approach', a 'National Action Plan for Dog Mediated Rabies Elimination from India' is being drafted.

Table: 20: Intersectoral collaboration for rabies prevention and control at the district

Sr. No.	Department	Responsibilities
1	Public Health	Surveillance Field investigation, hot spots identification. Laboratory Services Clinical Management of cases/ Referral arrangements. Protocols for primary/secondary and tertiary care Anti-Rabies vaccination Animal bite control activities Health Education to masses Vaccination of vulnerable groups. Reporting to SSU/State Health directorate. Media management. Engagement with all stakeholders.
2	Animal Husbandry and Veterinary Colleges/ Institutes	Post-mortem investigation of suspected animal rabies cases Collection of brain tissue samples from suspected rabid animals IEC and Advocacy efforts in the district. Support in animal rabies surveillance. Participation in multidisciplinary RRT investigations. Technical support for rabies control among domestic animals
3	Wildlife	Arrangements for the autopsy of suspected rabid animals Arrangements for capturing suspected rabid animals Isolation and observation of rabid animals Support to other departments.
4	Tribal welfare	Tribal health promoters to support surveillance activities. Ambulance support for referral of cases to Hospitals. Arrangement for organizing Medical Camps in all difficult to reach colonies.
5	Revenue	Financial support for conducting anti-rabies vaccination for animal and human component
6	Education	Vaccination and IEC activities coordination in Schools Information to the surveillance system
7	Women and Child Welfare	Taking services of Anganwadi workers, where there is no availability of ASHA
8	Information and Broadcasting	Dissemination of IEC
9	Local Self Government	Support anti-rabies vaccination, dog population control activities, animal vaccination and IEC activities
10	NGOs	Support surveillance and IEC activities.

9.2 Control of Rabies in The Animal Reservoir

Animal Rabies is a reportable disease in India as per the 'Prevention and Control of Infectious and Contagious Diseases in Animal Act, 2009'. Anyone who has reason to believe that an animal is infected with rabies or has been exposed to rabies should inform the Local veterinary authority.

Rabies is an excellent model for One Health collaboration. Control and elimination of rabies in dogs prevent rabies at its source. Only a combination of prompt post-exposure prophylaxis and large-scale mass dog vaccination can eliminate dog-mediated rabies.

i. **Dog census**: Efforts shall be made by the district authorities in the Animal Husbandry department to estimate the number of free-roaming/stray dogs and pet dogs. This would help in designing and evaluating the canine mass vaccination programme.

   a. Pet/owned dogs

   b. Community/semi-owned dogs and

   c. Feral/stray dogs.

ii. **Responsible Pet Ownership**: The strategy of promoting 'Responsible Pet Ownership' can prevent the spread of rabies. The public is advised to get pet dog licensing from the local authorities, 1st dose of anti-rabies vaccination when the puppy is about 2/3 months of age and yearly thereafter, provide proper nutrition and shelter to their pet dogs and not allow their pet dogs to loiter to prevent contact with infected animals.

iii. **Mass Dog Vaccination**: Dog vaccination is the most cost-effective single measure to protect humans from rabies and the mainstay of dog-mediated rabies control. In addition, vaccinating a dog is much cheaper than providing care to the victim of its bite.

Figure 20- Dog Vaccination

Completion of a mass dog vaccination drive, covering at least 70% of the dog population, within the shortest period possible should be attempted to stop transmission between dogs and from dog to human. Campaigns must be conducted recurrently (usually annually) to maintain the level of herd immunity in the susceptible population despite dog population turnover (births, deaths, animal movements) in the period between campaigns.

The Department of Animal Husbandry and Veterinary Services at the State and District level, local government such as Municipal councils, corporations, should take the lead in mass dog vaccination campaigns every year to cover at least 70% of dogs.

iv. **Dog Population Management**: This shall include stray dog population management by effective

implementation of the 'Animal Birth Control and Anti rabies (ABC-AR) programme' throughout the country. ABC is undertaken by the Veterinary Department of Municipal councils, corporations in urban/rural areas and this authority could be contacted for ABC. The objective of dog population management in the context of dog-mediated

rabies control is to improve and maintain vaccination coverage by reducing population turnover and risky dog behaviour. Mass culling of dogs has been proven ineffective and may even be counterproductive.

v. **Animal rabies**: Stray or unwanted dogs, cats or any other domestic animal involved in an exposure that could potentially transmit rabies should be confined and observed. If this is not possible, the animal should be humanely euthanized in a way that does as little damage to the brain as possible, and the head/brain sample submitted for laboratory examination and rabies testing.

vi. **Risk of rabies transmission in other animals**: A history of abnormal or aggressive behaviour in any domestic animal, or potential exposure of a domestic animal to other animals that could transmit rabies (including other domestic animals of unknown rabies vaccination status or wild animals) would also have the likelihood of rabies exposure.

9.3 Environmental Influences on Rabies

It is important to understand the influence that environmental factors can have on dog populations and behaviour. Achieving and maintaining a high dog vaccination coverage can be hampered by high dog population turnover rates, when unvaccinated dogs quickly replace vaccinated dogs. Transmissions cycles can further include wildlife which can be infected by dogs as well.

Open garbage disposal sites or solid waste accumulation in urban settlements can attract a high numbers of dogs and increase the transfer of infectious diseases. Dogs competing for food at these sites can increase overall aggression further leading to an increased risk of dog bites.

Efficient waste management is therefore contributing to dog population management and needs engagement beyond the veterinary and human health sectors.

9.4 Awareness And Education - IEC

Education on dog behaviour and bite prevention (for children and adults) can decrease both the incidence of human rabies and the financial burden of treating dog bites. Increasing awareness on rabies, responsible pet ownership, bite prevention and immediate care measures after a bite is an essential part of any programme and requires One Health collaboration between, at a minimum, the human and veterinary health sector. Community engagement is critical in achieving and sustaining effective delivery of rabies interventions. This is where One Health really starts. Improving the accessibility of these to often remote communities thereby improves overall access to health care – an integrated approach to strengthening health systems bottom-up.

The public education sector and available mass media (Television, Newspapers and Radio) should be used for the dissemination of information on bite prevention and anti-rabies treatment for animal bites. Messages need to be coordinated between the sectors to avoid conflicting information.

More information on IEC was already provided in Session 7 – Risk communication.

9.5 Training of Health & Veterinary Professionals in One Health

All levels of human (doctors, staff nurses, health workers and ASHAs) & veterinary (veterinarians and veterinary inspectors) professionals in the district shall be trained in the prevention and control of rabies. Coordination mechanisms between human health and the veterinary department for rabies control in the community needs to be established.

Table 21: Actions to be taken by Medical officer In-charge centres health facility / District Nodal officer/ State Nodal officer NRCP

For Animal Bite cases	For Human Rabies cases
• Identify areas of clustering of animal bite cases • Ensure the availability of ARV/ARS in centres catering for the identified areas • Notify Vet. Dept /Municipalities to initiate appropriate measures such as Dog population management, MDV. • In case of any animal is suspected of Rabies, Notify the local Vet. Dept /Municipalities • Conduct a meeting with the vet. Dept. as part of zoonotic committees for joint action • Follow up	• Identify areas with human rabies • Find out reasons (Incomplete treatment, NO PEP taken by victims, low awareness etc.) • Ensure the availability of ARV/ARS in centres catering for the areas • Intensify IEC activities in the area • Notify Vet. Dept/Municipalities to initiate appropriate measures- DPM, MDV • Conduct a meeting with the vet. Dept. as part of zoonotic committees for joint action • Follow up

9.6 Actions following human rabies cases reported by Health authorities

Epidemiological investigations of rabies cases are crucial to identify the source of infection, contacts, and probable other patients who might be exposed etc. Investigations should ideally not only follow rabies cases but also dog bites – and integrated bite case management (IBCM) combines many things. It is an enhanced surveillance method that connects different sectors and includes timely sharing of data between them. It could further improve detection of cases, remove dangerous animals from the community, increase compliance with measures and vaccination and create better buy-in and support using available resources in the best way.

- For suspected human rabies cases
- if possible, collect samples ante-mortem (e.g. saliva, skin, CSF, serum) and post-mortem (brain tissue) for laboratory confirmation
- Conduct Verbal Autopsy to collect a case history for the patient
- For probable human rabies cases
- Identify contacts of patients and/or animals involved for follow up
- Ensure mechanism is in place for transportation of samples to reference laboratory
- Ensure the Notification of Rabies case
- Notify appropriate local authorities of a suspected rabid animal
- Provide PEP to close contacts
- Trace other animal bites and ensure PEP for other victims

IBCM showcases a One Health approach in action – it requires both human and animal health professionals to work together. Human health professionals are responsible for taking care of the bite victims, while animal health professionals evaluate the biting animal in parallel. Case investigation is shared and reporting of information is two-way so that the treating physician can perform a risk assessment and make further decisions based on that.

POINTS TO REMEMBER

- Main sectors involved in rabies control viz. Health and Veterinary sectors are working in isolation and need to work in coordination
- All other sectors viz. Urban development, Education, Environment & Wildlife, Civic bodies, shall extend cooperation and coordination for control of rabies
- Mass Dog Vaccination aiming at a 70% vaccination coverage is the most effective measure to control canine rabies
- Dog population management can improve and maintain vaccination coverage by reducing population turnover and risky dog behaviour.
- Environmental factors like open garbage disposal sites or solid waste accumulation in urban settlements influences dog populations and rabies transmission
- Coordination needs to be done with the veterinary department for rabies control in the community. Actions to be taken by the Medical officer In-charge health facility / District Nodal officer/ State Nodal officer NRCP
- The nodal officer of NRCP must identify areas of clustering of animal bite cases and ensure the availability of ARV/ARS in centres catering for the identified areas
- Areas with human rabies need to be identified to identify reasons (incomplete treatment, no PEP taken by victims, low awareness etc.)
- Notification needs to be done by Nodal officer NRCP to Vet. Dept/Municipalities to initiate appropriate measures- DPM, MDV

FREQUENTLY ASKED QUESTIONS (FAQS)

- Rabies (in man and animals) is fatal even today and there is no cure for it anywhere in the world.
- Rabies is enzootic (widely prevalent in animals) in India and hence, all animal bites/licks (such as mongoose, shrews or any unknown animal bites) are dangerous.
- The Carrier state of rabies in dogs (and cats) is not yet conclusively proven and established. Hence, both WHO and the Government of India recommend observation of animals during Post Exposure Treatment.
- Immediate and early wound treatment to remove traces of saliva is very important.
- The physician should carefully go through the product information literature (of both vaccine and serum) and use the immune biologicals accordingly.
- There is no contraindication for post-exposure immunization including pregnancy, lactation, HIV, AIDS, other infectious diseases, and conditions.
- When in doubt of degree of exposure to rabies risk, it is safer to over treat than undertreat,
- Correct post-exposure immunization, more so use of RIG/serum in category III exposure is lifesaving.
- Modern rabies vaccines are effective and safe and shall always be preferred and injected IM into deltoid/thigh in young children and never in the gluteal region.
- There is no single-dose vaccine or vaccine that gives lifelong immunity.
- Pre-exposure vaccination of “at-risk ” individuals should be encouraged.
- Pet owners should be strongly advised to get their dog/cat vaccinated regularly and obtain a license from local municipal authorities.

ANNEXURE- 1: DETAILS OF RABIES IMMUNOGLOBULIN: (SOURCE: DCGI)

S.no	Name of firm	Strength	Presentation of vaccine (Vial/PFS/other)	Shelf life and storage condition
1	M/s Haffkine Biopharmaceuticals Corporation Ltd, Pimpri, Pune-411018	Each ml contains 300IU/ ml	5 ml/vials Pack of 10 Vials each box	24 Months Store between 2° C and 8° C
2	M/s Serum institute Pvt ltd., 212/2 Hadapsar, Pune-411028	1500 IU/ 5mL 1000 IU/ 5mL	5 ml Vial	24 Months
3	M/s Bharat Serum and Vaccine Ltd Plot No: K-27/ Anand Nagar Mumbai-400008	1000 IU/ 5mL	5ml Vial	24 months Store between 2° C and 8° C
		300 IU/ mL	5ml Vial	24 months Store between 2° C and 8° C
4	M/s Central Research Institute Dist. Solan (H.P.) 173205	1500 IU/ 5mL	5ml Vial	24 months
5	M/s Virchow Biotech Pvt Ltd Sy. No. 172 part, Gaglapur Village-Quthbullahpur Mandal Reddy District Telangana	1500 IU/ 5mL Liquid	5 ml vial	24 months
6	M/s Vins Bioproducts Ltd Sy. No.117 Thimapur Village Kothur Mandal Mahbubnagar District Telangana	1500 IU/ 5ML Liquid vial 1000 IU/ 5mL (For Export)	5ml vial	24 months
7	M/s Premium Serums and Vaccines Pvt Ltd., S.No. 354-1 & 2A/1 Narayangaon, Tal. Junnar, Dist. Pune-410504 Pune	1500 IU/ 5mL Vial 1000 IU/ 5mL Liquid		24 months

ANNEXURE-2 DETAILS OF RABIES VACCINE, HUMAN (SOURCE: DCGI) AVAILABLE IN INDIA

Name of the firm	Doses & Route of Administration	Presentation (Vial/PFS/ other)
M/s Human Biological Limited, Hyderabad	1 ml – 1 dose Intramuscular 0.1ml- 1dose Intradermal	Vial
M/s Cadila Healthcare Limited, Ahmedabad	1 ml single-dose used for Intramuscular 0.1 ml / 10 doses used for intradermal.	Vial
M/s Chiron Behring Vaccines Ltd., Gujarat	Single-dose 1 ml dose Intramuscular Multidose 10 dose (0.1 ml/dose) Intradermal	Vial
M/s Serum Institute of India Pvt. Ltd., Pune	1 ml – 1 dose Intramuscular 0.1ml- 1dose Intradermal	Vial
M/s Bharat Biotech International Ltd. Hyderabad	1 ml – 1 dose Intramuscular 0.1ml- 1dose Intradermal	Vial

ANNEXURE 3

NATIONAL RABIES CONTROL PROGRAMME

ANIMAL BITE EXPOSURE REGISTER*

Name of the Health Facility: Type of Health Facility:

Address & Contact Details

Health Facility Code: Reporting Month Year

Registration		Type of Patient (New/ OLD)	Patient Detail				Exposure History			Exposure details		Post Exposure Prophylaxis					
S/N	Date		Name	Age	Sex (M/ F/ Other)	Residential Address	Date of Bite	Site of Bite on Body: (Extremities/ Trunk/ Head-Neck Face/ Back)	Biting Animal Species - dog/ cat/ monkey/ others (specify)	Category of Bite (I/II/ III)	Address where bite incidence took place	Adequate Washing of Bite wound Done(Y/N)	Rabies Immunoglobin Given (Y/N)	ARV Route ID/IM	Previous History of ARV Vaccination(-Complete / partial/ NA)	Biting Animal Status after 10 days (Dead/ Alive/ Not traceable)	Remarks (Dose no/ PEP status complete/ incomplete)

Any Clustering of cases Observed: if yes write the details

Category I: Touching or feeding of animals; Licks on intact skin; Contact of intact skin with secretions/ excretions of rabid animal / human case, 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 (i.e. licks)

*To be maintained by Health facility providing treatment to animal bite cases

Summary

Indicator	Old	New	Total		Indicator	IM	ID
Total Number of Patients attended					Route of ARV Administration		
	I	II	III		Total Number of Cat II patients receiving ARS		
Category wise Number of Patients							

ANNEXURE 4

NATIONAL RABIES CONTROL PROGRAMME

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 Biting animal status Dog ☐ Monkey ☐ Alive ☐ Cat ☐ Other ☐ 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

ANNEXURE 5

RABIES POST EXPOSURE TREATMENT CARD (Patient's Copy)

NATIONAL RABIES CONTROL PROGRAMME

Name and address of the health facility

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 Biting animal status Dog ☐ Monkey ☐ Alive ☐ Cat ☐ Other ☐ 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

ANNEXURE-6

DISTRICT MONTHLY REPORT (NRCP-M02) *

Base line data collection at District Level (NRCP-BLD)

NATIONAL RABIES CONTROL PROGRAMME

District Monthly Report (NRCP-M02)*State Name:

District Name: District Focal Point

Name:

Address: Month and Year of Reporting:

Total no. of health facilities providing facility for animal bite management/ Number of Facilities submitted report	
Mention no. of patients as per type of biting animal	District Total
Dog	
Cat	
Monkey	
Any other (specify)	
Mention no. of patients as per Category of bite	District Total
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)	District Total
Details of patients as per Route of vaccination	
IM route (Essen schedule on day 0,3,7,14,28)	
ID route (update Thai Red Cross Regimen: 2-2-2-0-2)	
No. of Category III victims given ARS	
Number of Patients completed PEP	
Suspected/ probable/ Confirmed Rabies Cases/ Deaths Reported in district	District Total
No. of human rabies deaths confirmed by laboratory tests	
No. of clinically Suspected Rabies cases seen at OPD (who refused admission)	
No. of clinically Suspected Rabies cases admitted	
No. of clinically Suspected Rabies cases left against medical advice	
No. of clinically Suspect Rabies deaths in hospital	
Total Vaccine (no. of vials) used in the District (monthly)	District Total
Opening balance	
Quantity received	
Quantity utilized	
Closing balance	
Total ARS (no. of vials) used in the District (monthly)	
Opening balance	
Quantity received	
Quantity utilized	
Closing balance	
Information on Rabies and Animal Bite cases shared with District veterinary Officer	Yes/ No
Any Clustering of Animal Bite Cases observed? If yes write the details including locality	
Any other remarks	

Date: Signature:

*Compiled Monthly report of Animal Bite Victims receiving treatment at all Anti Rabies Clinics/Health facilities providing animal bite management
(to be submitted by District Focal Point to State Nodal Officer on every month)

ANNEXURE-7

Line List of Suspected/ Probable/ Confirmed Rabies Cases/ Deaths*

NATIONAL RABIES CONTROL PROGRAMME

S. No.	Name	Age	Sex	Contact Number	Village	Sub District/ Taluk/ Block/ Mandal	District	State	Biting Animal	Suspected/ Probable/ Confirmed	Address of place where bite incidence took place	Category of Bite	Status of PEP (Complete/ Partial/ Nil/ NA)	Name of the health facility reported Rabies case	Outcome of patient (Death in Hospital/ LAMA/ Alive)

- To be reported by Health facilities to district nodal person, State Nodal Person & National Program Division at nrcp.ncdc@gmail.com
- To be submitted to District Focal Point to State Nodal Officer and NCDC on every month

ANNEXURE-8
NRCP STATE MONTHLY REPORT
State Monthly Report (NRCP-M02) *
NATIONAL RABIES CONTROL PROGRAMME

State Name:
State Focal Point Name:
Address:
Month and Year of Reporting:

Total no. of health facilities providing facility for animal bite management/ Number of Facilities submitted report	
Mention no. of patients as per type of biting animal	District Total
Dog	
Cat	
Monkey	
Any other (specify)	
Mention no. of patients as per Category of bite	District Total
I. Touching or feeding of animals, Licks on intact skinContact 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)	
Details of patients as per Route of vaccination	District Total
IM route (Essen schedule on day 0,3,7,14,28)	
ID route (update Thai Red Cross Regimen: 2-2-2-0-2)	
No. of Category III victims given ARS	
Number of Patients completed PEP	
Suspected/ probable/ Confirmed Rabies Cases/ Deaths Reported in district	
No. of human rabies deaths confirmed by laboratory tests	
No. of clinically suspected rabies cases seen at OPD (who refused admission)	
No. of clinically suspect rabies cases admitted	
No. of clinically suspected rabies cases left against medical advice	
No. of clinically suspect rabies deaths in hospital	
Total Vaccine (no. of vials) used in the District (monthly)	District Total
Opening balance	
Quantity received	
Quantity utilized	
Closing balance	
Total ARS (no. of vials) used in the District (monthly)	District Total
Opening balance	
Quantity received	
Quantity utilized	
Closing balance	
Information on Rabies and Animal Bite cases shared with State veterinary Officer	
Any Clustering of Animal Bite Cases observed? If yes write the details including locality	
Any other remarks	

Date: Signature:

*Compiled Monthly report of Animal Bite Victims receiving treatment at all Anti Rabies Clinics/Health facilities providing animal bite management
(to be submitted by District Focal Point to State Nodal Officer on every month)

ANNEXURE-9
HUMAN RABIES CASES MONTHLY REPORT
FROM INFECTIOUS DISEASE/ ANY OTHER HOSPITAL TO STATE NRCP OFFICER.
NATIONAL RABIES CONTROL PROGRAMME

Health facility Monthly Summary report
District Name:
Name of Health Facility (PHC/CHC/District hospital/ Anti Rabies Clinic Etc) _____
Name of Focal Point
Address:
Month and Year of Reporting

Total no. of health facilities providing facility for animal bite management/ Number of Facilities submitted report	
Mention no. of patients as per type of biting animal	Health Facility Total
Dog	
Cat	
Monkey	
Any other (specify)	
Mention no. of patients as per Category of bite	Health Facility Total
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)	
Details of patients as per Route of vaccination	Health Facility Total
IM route (Essen schedule on day 0,3,7,14,28)	
ID route (update Thai Red Cross Regimen: 2-2-2-0-2)	
No. of Category III victims given ARS	
Number of Patients completed PEP	
Suspected/ probable/ Confirmed Rabies Cases/ Deaths Reported in district	Health Facility Total
No. of human rabies deaths confirmed by laboratory tests	
No. of clinically suspected rabies cases seen at OPD (who refused admission)	
No. of clinically suspect rabies cases admitted	
No. of clinically suspected rabies cases left against medical advice	
No. of clinically suspect rabies deaths in hospital	
Total Vaccine (no. of vials) used in the District (monthly)	
No. of human rabies deaths confirmed by laboratory tests	
No. of clinically suspected rabies cases seen at OPD (who refused admission)	
No. of clinically suspect rabies cases admitted	
No. of clinically suspected rabies cases left against medical advice	
No. of clinically suspect rabies deaths in hospital	
Total Vaccine (no. of vials) used in the District (monthly)	Health Facility Total
Opening balance	
Quantity received	
Quantity utilized	
ClosingTotal ARS (no. of vials) used in the District (monthly)	

Total ARS (no. of vials) used in the District (monthly)	Health Facility Total
Opening balance	
Quantity received	
Quantity utilized	
Closing balance	
Information on Rabies and Animal Bite cases shared with State veterinary Officer	
Any Clustering of Animal Bite Cases observed? If yes write the details including locality	
Any other remarks	

Date: Signature:

*Compiled Monthly report of Animal Bite Victims receiving treatment at all Anti Rabies Clinics/Health facilities providing animal bite management
(to be submitted by in charge – Health facility (PHC/Anti Rabies Clinic /CHC/ Sub divisional hospital) to District Nodal Officer on every month

ANNEXURE-10
GUIDE TO POST EXPOSURE PROPHYLAXIS

MINISTRY OF HEALTH AND FAMILY WELFARE
GOVERNMENT OF INDIA

RABIES POST EXPOSURE PROPHYLAXIS PROTOCOL AFTER ANIMAL BITE

DECISION TO TREAT

CATEGORY I • Touching or feeding of animals • Licks on intact skin	Gently wash all scratches or wounds with mild soap and running water for at least "15 minutes"		Vaccine and RIG not indicated
CATEGORY II • Nibbling of uncovered skin • Minor scratches or abrasions without bleeding	Gently wash all scratches or wounds with mild soap and running water for at least "15 minutes"		ONLY RABIES VACCINATION
CATEGORY III • Single or multiple transdermal bites or scratches • Licks on broken skin • Contamination of mucous membrane with saliva	Gently wash all scratches or wounds with mild soap and running water for at least "15 minutes"		RABIES VACCINATION + RIG INFILTRATION

*All categories of bite should be reported in NRCP monthly report.

POST EXPOSURE PROPHYLAXIS PROTOCOL

CATEGORY I

Vaccine and RIG not indicated

CATEGORY II

PREVIOUSLY NOT IMMUNISED

RIG IS NOT INDICATED

IMMUNE COMPETENT PERSON

Give 04 doses OF RABIES VACCINE via intradermal route - ID (0.1 ml 2 sites) on day 0 - 3 - 7 - 28

OR

Give 05 doses OF RABIES VACCINE via intramuscular route-IM (1 vial, 1 site) on day 0 - 3 - 7 - 14 - 28

PREVIOUSLY* IMMUNISED

RIG IS NOT INDICATED**

IMMUNE COMPETENT PERSON

Give 02 doses OF RABIES VACCINE via intradermal route - ID (0.1 ml 1 site) on day 0 - 3

OR

Give 02 doses OF RABIES VACCINE via intramuscular route-IM (1 vial, 1 site) on day 0 - 3

CATEGORY III

PREVIOUSLY NOT IMMUNISED

INFILTRATE WOUNDS WITH RIG AS SOON AS POSSIBLE

IMMUNE COMPETENT PERSON

Give 04 doses OF RABIES VACCINE via intradermal route - ID (0.1 ml 2 sites) on day 0 - 3 - 7 - 28

OR

Give 05 doses OF RABIES VACCINE via intramuscular route-IM (1 vial, 1 site) on day 0 - 3 - 7 - 14 - 28

Rabies vaccine should be administered in deltoid muscles for adult and children
&
in anterolateral thigh (IM) for infants and small children. Rabies vaccine should not be injected in the gluteal region

FOR IMMUNE COMPROMISED PERSON

- Proper wound management followed by local infiltration of RIG in both category II and III exposures
- After this, complete coures of Rabies vaccine via Intramuscular route in both category II and III exposures should be undertaken

*Previously Immunised Case: Animal bite patient who can document previous history of complete post exposure or pre exposure prophylaxis by modern vaccines.

FOR CATEGORY II & III, IF REPEAT EXPOSURES IN THE FUTURE, TREAT AS PREVIOUSLY IMMUNIZED AND FOLLOW THE ALGORITHM AS ABOVE

RABIES IMMUNOGLOBULIN - RIG DOSAGE

- The maximum dosage for HRIG i.e. Human Rabies Immunaglobulin is 20 IU/Kg of the body weight and that of ERIG i.e. Equine Rabies Immunoglobulin is 40 IU/Kg of body weight.
- The entire immunoglobulin dose or as much as anatomically feasible but possibly avoiding compartment syndrome, should be carefully infiltrated into or as close as possible to the wound(s) or exposure site.
- Do not give RIG beyond the 7th day after the 1st vaccine dose on day 0.
- **In previously vaccinated individual/s where direct nerve exposure is suspected treating physician may consider RIG infiltration

NRCP ADVOCATES INTRADERMAL ROUTE FOR RABIES VACCINE ADMINISTRATION

NATIONAL RABIES CONTROL PROGRAMME

ADOPT ONE HEALTH, STOP RABIES

www.mohfw.nic.in | www.mygov.in | www.pmindia.gov.in | mohfwindia | @MoHFW_INDIA | http://ncdc.gov.in/ | @director_NCDC

ANNEXURE-11
ADDRESS OF HUMAN AND ANIMAL RABIES DIAGNOSTIC LABORATORIES IN INDIA

Human Rabies Diagnostic Laboratories	
1	Department of Neurovirology, NIMHANS, Bangalore 560029
2	Zoonosis Division, National Centre for Disease Control, Sham Nath Marg, Delhi – 110 054
3	Pasteur Institute of India, Coonoor- 64310, Tamil Nadu
4	Central Research Institute, Solan, Kasauli, Himachal Pradesh 173204
5	Haffkine Institute, Acharya Donde Marg Parel, Mumbai 400012, Maharashtra

Animal Rabies Diagnostic Laboratories	
OIE Twinned Rabies Diagnostic Laboratory Dept. of Microbiology Veterinary college, KVAFSU Hebbal, Bangalore-560024 Ph:080-23410509 / 09449992287	Institute of Animal Health and Veterinary Biologicals Bellary Rd, Bengaluru, Karnataka 560024 Phone: 080 2341 1502
ICAR - National Institute of Veterinary Epidemiology and Disease Informatics, Ramagondanahalli, Post Box No. 6450, Yelahanka, Bengaluru, Karnataka 560064 Phone: 080 2309 3110	Disease Investigation officer, Chief Disease Investigation Office, Department of Animal Husbandry, Palode, Thiruvananthapuram-695562 Phone: 09446557186
Department of Pathology, College of Veterinary and Animal Sciences is a veterinary college Santosh Nagar, Mannuthy, Thrissur, Kerala 680651 Phone: 0487 237 0451	Department of Pathology, College of Veterinary and Animal Sciences, Kerala Veterinary and animal Sciences University, Pookode, Wayanad, Kerala 673576 Phone: 04936 256 640
Rabies Diagnostic Laboratory, Dept. of animal Biotechnology, Madras Veterinary college, TANUVAS, Vepery, Chennai-600007 Contact: 09486784973	Department of Microbiology, Anand Agricultural University, Anand 388 110, Gujarat, India Ph: 09824243564
Department of Veterinary Microbiology, Bombay Veterinary college Parel, Mumbai 400012 Contact Number: 09167493932	Department of TVCC, Veterinary college, KVAFSU Shivamoga, Karnataka Contact: 08277270598
Rabies Laboratory, Department of Veterinary Pathology Ludhiana - 141 004. Punjab. Ph.: (O): 0161 - 401961	Department of Pathology ICAR-Indian Veterinary Research Institute Izzatnagar, Bareilly-243122 Uttar Pradesh

ANNEXURE 12

MONTHLY REPORT ON LABORATORY DIAGNOSIS OF RABIES (HUMAN/ANIMAL)

National Rabies Control Programme
National Centre for Disease Control
Ministry of Health and Family Welfare
Government of India

Name & Address of the Laboratory:
Name of the in charge:
Contact Number: Email ID:
Period of Reporting: Date of Reporting:
A. Summary of Report on Diagnostic Services
Tests Available: Sellers/FAT/dRIT/PCR/ Virus Isolation/ Rapid test

Species	Specimen	Number Tested	Number Positive	Remarks
Human	CSF			
	Brain Tissue			
	Saliva			
	Any Other			
Dog	Brain			
Cat	Brain			
Monkey	Brain			
Other Animals (Please Specify)				

B. Summary of Anti Rabies Antibody Titres
Tests Available: ELISA (Name of the Kit: _____) /RFFIT/ any other (Specify)

Specimen			Number Tested	Titre		Remarks
				>0.5 IU/ml	<0.5 IU/ml	
Humans	CSF					
	Blood	After Complete Vaccination				
		Partial Vaccination				
		No Vaccination				
Animals	Blood (post Vaccination)					

ANNEXURE 13
SUMMARY OF VACCINATION SCHEDULE

Type of Prophylaxis	Route of Administration	Number of Visits	Day of Dose	Number of injections Per Visit	Site of Injection
Post Exposure Prophylaxis	Intradermal (ID)	4	Day 0, 3, 7 and 28	2	Adults: Deltoid Muscle Infants and small Children: Anterolateral Thigh
	Intramuscular (IM)	5	Day 0, 3, 7, 14 and 28	1	
Pre-Exposure Prophylaxis	Intradermal (ID)	3	Day 0, 7, and 21 or 28	1	
	Intramuscular (IM)	3	Day 0, 7, and 21 or 28	1	
Re-exposure	Intradermal (ID)	2	Day 0 & 3	1	
	Intramuscular (IM)	2	Day 0 & 3	1	

Intradermal Dose: 0.1ml
Intramuscular Dose: 1 entire vial will be 1 full dose

ANNEXURE 14
IHIP EVENT ALERT FORM

Integrated Health Information Platform
Integrated Disease Surveillance Programme
Ministry of Health and Family Welfare, Government of India

Home | About | Forms | Outbreaks | Reports | View Map | Administration | Downloads

Event Alert

Event Occurred Date

State* -----Select-----

District* -----Select-----

Sub District -----Select-----

Health Condition* Animal Bite - Others

Source* -----Select-----

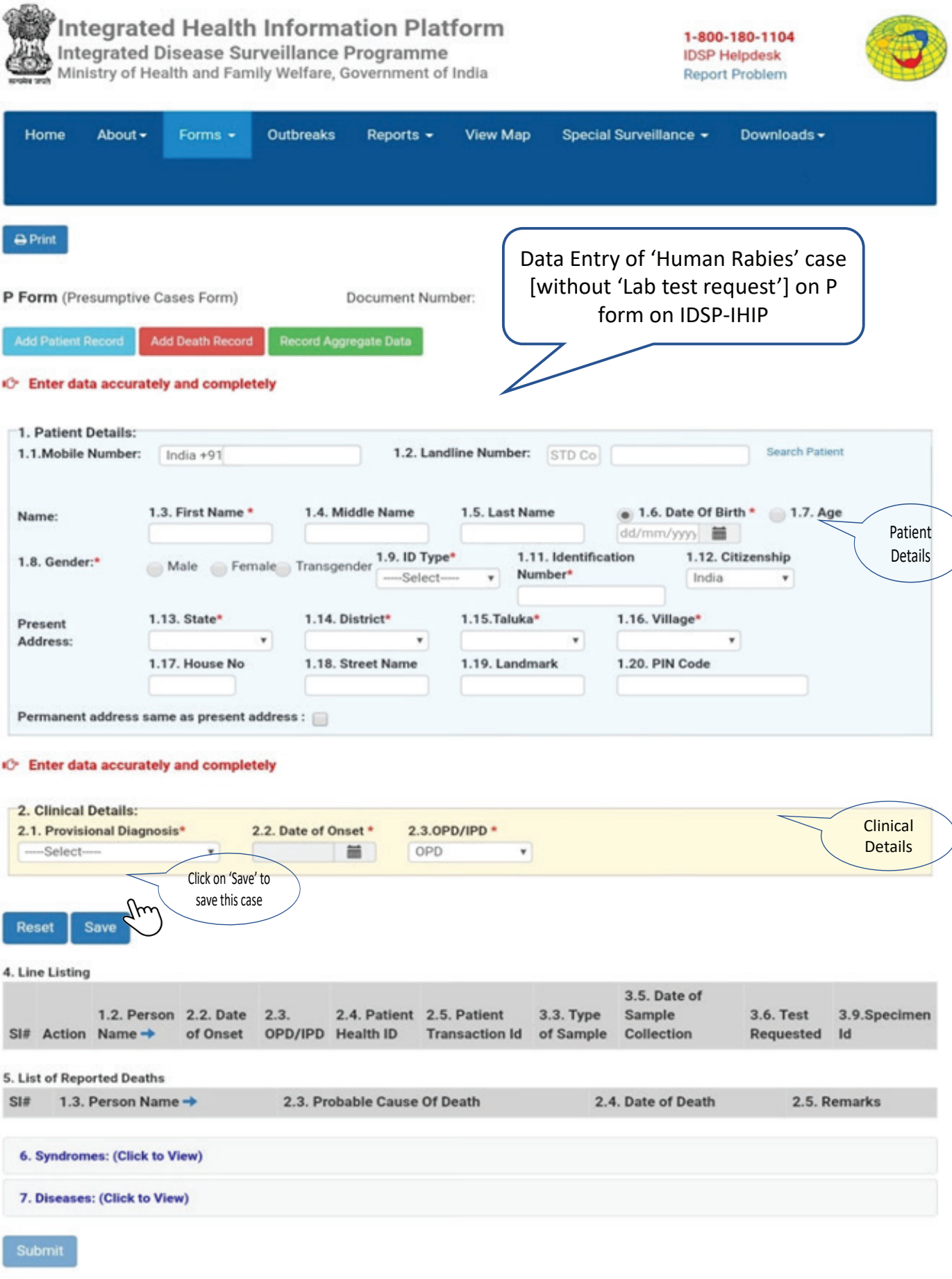
Message*

Document

Choose Files No file chosen

Submit

ANNEXURE 15
P FORM (IHIP)



Myths and Misconceptions

- **Any animal that has bitten humans should be killed because of the danger of rabies.**
- **First aid is not helpful for those who have been bitten or scratched by an animal suspected of having rabies.**
- **There is one single, more costly injection to prevent rabies.**
- **Puppies do not transmit rabies.**
- **Vaccination is to be given in stomach and is very painful**

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