NATIONAL INSTITUTE FOR COMMUNICABLE DISEASES

Division of the National Health Laboratory Service

RABIES

Clinical risk assessment and management

USUKU LOKUQWASHISA NGAMARABI
28 kuSEPTEMBER

RABIES AWARENESS 2025

Dr Vuyiswa Kumalo

14 October 2025

Division of Public Health Surveillance and Response

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Objective and overview

- To refresh the clinical management, focusing on rabies risk assessment and appropriate exposure management.

- Transmission
- Human rabies disease
- Pre-exposure prophylaxis (PrEP)
- Risk assessment
- Post-exposure prophylaxis (PEP)
- Laboratory testing

Slides courtesy Dr Saffiya Umar

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- Rabies is a viral, zoonotic disease
- Rabies is vaccine-preventable
- The rabies virus attacks the central nervous system resulting in encephalitis, coma and death
- Incubation period: 20-60 days
- Rabies is fatal once symptoms occurs
- NO treatment available
- Post exposure prophylaxis (PEP) is an emergency

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Transmission of rabies

- Rabies virus is spread to human through contact with saliva of infected mammals: dogs, cats.
- All mammals can potentially transmit rabies: mongoose, jackal, livestock, seals.
- Bats: “rabies-like” virus in some species.

Source: RAG WRD2025 Social media toolkit

Routes of transmission:

- Bites
- Scratches
- Wounds that breach the skin
- Contact with mucous membranes

Rarely,

- Human-to-human transmission: associated with organ transplantation
- Ingestion: No cases from consuming meat or milk from a rabid animal
- Risk may exist during slaughter involving contact with brain, spinal cord or saliva

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Rabies clinical disease

Initial Symptoms

- Non-specific, resembles a viral infection:
  - Fever, headache, discomfort, pain, tingling, or itching (paraesthesia) at bite site

Clinical Forms:

1. Furious Rabies (~80%)
   - Agitation, hyperactivity, confusion, episodes of aggression with lucidity (periods of calm).
   - Classic signs: hydrophobia (spasms when attempting to drink water) & aerophobia (spasms triggered by movement of air).
2. Paralytic Rabies (~20%)
   - Muscle weakness & flaccid paralysis.
   - Progresses more slowly; frequently misdiagnosed for other causes of flaccid paralysis.

Mortality and Management:

- Almost always fatal once symptoms appear
- **NO effective treatment** once symptomatic
- Management- palliative care (comfort and ↓ suffering)

NB: Prompt Post-Exposure Prophylaxis (PEP) *before* symptoms begin, as no treatment for rabies.

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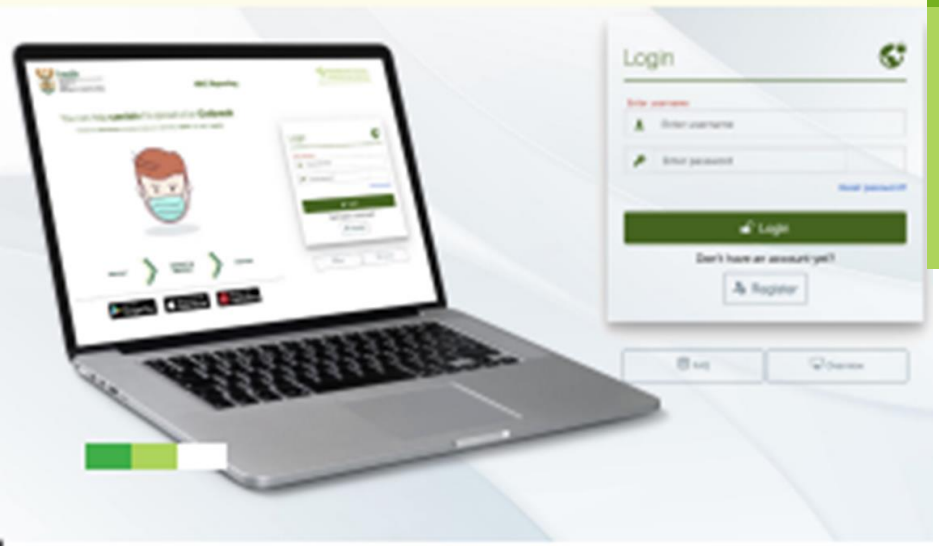
Notify suspected cases of human rabies disease

WHO IS RESPONSIBLE FOR REPORTING NMC?

Every doctor, nurse (health care provider), laboratory, and medical scheme in both the public and private health sectors who diagnoses a patient with any of the Notifiable Medical Conditions (NMCs) is required to report the case. ***Failure to do so is a criminal offence.***

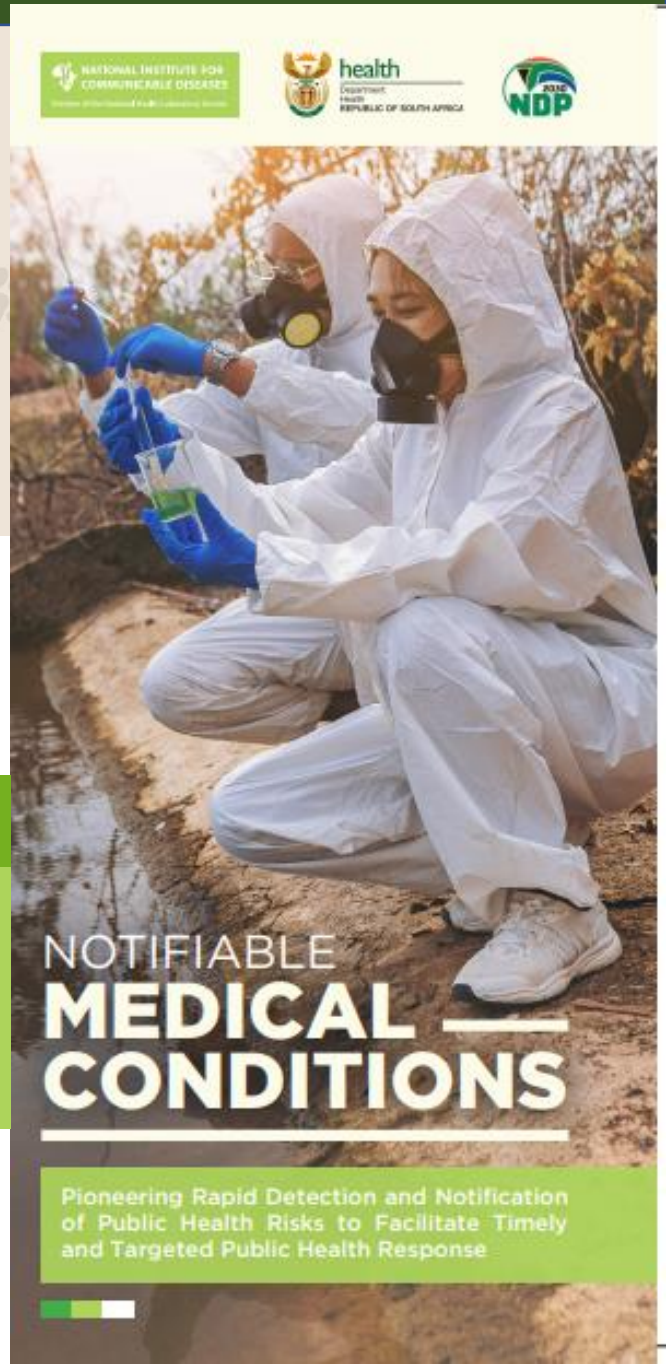


CONTACT US

NMC Helpline: 072 621 3805

Email: NMCsurveillanceReport@nicd.ac.za

Fax: 086 639 1638, **www.nicd.ac.za**



Pre-exposure prophylaxis (PrEP)

- Recommended for individuals at high or continual risk of exposure.
- Occupational risk: vets, veterinary technicians, animal welfare, lab workers and animal handlers.
- Travel: to a rabies endemic area.
- Hobbies: divers, bat enthusiasts or spelunkers.

If exposure to a potentially rabid animal occurs more than 3 months after PrEP, a rabies vaccine BOOSTER must be administered.

NB. PrEP mitigates the requirement for rabies immunoglobulin (RIG) after an exposure.

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Pre-exposure prophylaxis (PrEP)

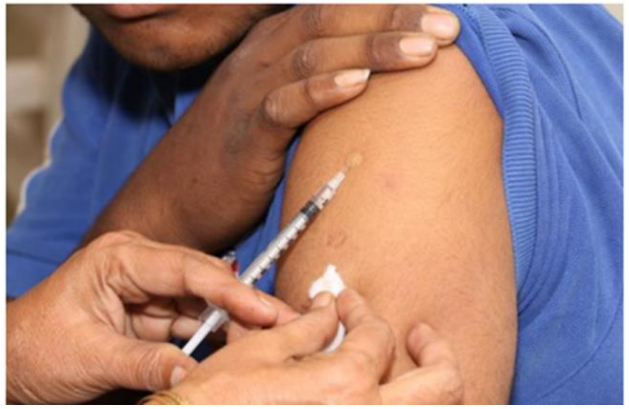
Table 4. Summary of PrEP regimen for rabies vaccines available in SA.

PRODUCT NAME	DOSAGE	SITE OF ADMINISTRATION	SCHEDULE
i. Verorab™	0.5 ml (per vial) For intramuscular, full vial For intradermal, 0.1 ml per dose	Intramuscular: deltoid muscle in adults **OR** Intradermal*: 1 dose per site, 2 sites per day. Intradermal sites: deltoid muscle, anterolateral thigh or supra scapular region	**Intramuscular:** One dose each on days 0 and 7 **Intradermal:** Two doses each on days 0 and 7
ii. Rabipur™ *Note: This product is currently not available in SA.*	1.0 ml (per vial) For intramuscular, full vial For intradermal, 0.1 ml per dose		

Chirorab

**The intradermal schedule is recommended when PrEP is applied to groups of individuals and a cost benefit would apply (i.e. a single vial represents multiple doses)*

Note: Changes in the route of administration (IM vs. ID) during the same PrEP course are acceptable, if unavoidable, to ensure complete PrEP course.



Verorab is available in the private sector

Chirorab is available in the public sector

Source: National Guidelines for the prevention of Rabies in Humans, South Africa. National Department of Health, National Institute for Communicable diseases, September 2021

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Risk assessment for post-exposure prophylaxis (PEP)

All animal exposure must be assessed for potential rabies virus exposure

Risk assessment will guide whether rabies PEP is indicated

There are a number of factors that must be considered during the risk assessment

Animal specific

+

Wound category

→

PEP indicated?

Risk assessment: Wound evaluation

PATIENT WITH ANIMAL EXPOSURE			
Category of the exposure	**Category I** **No direct contact** with animal (for example, being in the presence of a rabid animal or petting an animal)	**Category II** Direct contact with animal but **NO BREACH OF SKIN, NO BLEEDING** (for example bruising or superficial scratch)	**Category III** Direct contact with animal with **BREACH OF SKIN, ANY AMOUNT OF BLEEDING, CONTACT WITH MUCOSAL MEMBRANES** (for example lick on/in eyes or nose), **CONTACT WITH BROKEN SKIN** (for example licks on existing scratches), **ANY CONTACT WITH A BAT**
Management based on category	WASHING OF EXPOSED SKIN SURFACES	WOUND MANAGEMENT + PROVIDE FULL COURSE OF RABIES VACCINE	WOUND MANAGEMENT + RABIES IMMUNOGLOBULIN + FULL COURSE OF RABIES VACCINE

ANY BREACH IN THE SKIN OR ANY AMOUNT OF BLEEDING:

CATEGORY 3

Source: National Guidelines for the prevention of Rabies in Humans, South Africa. National Department of Health, National Institute for Communicable diseases, September 2021

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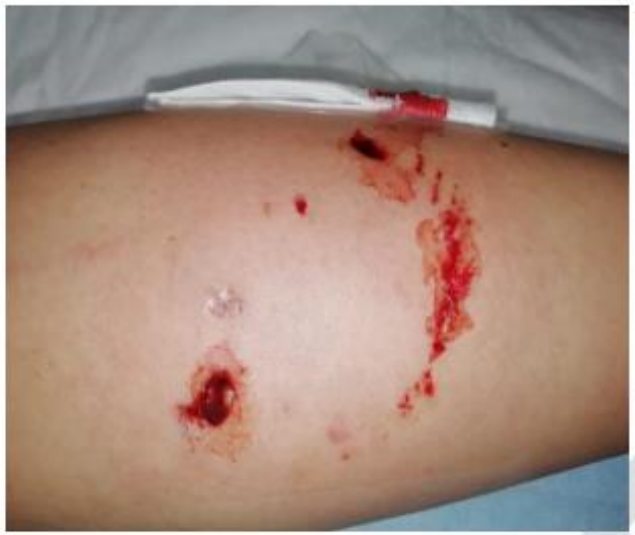
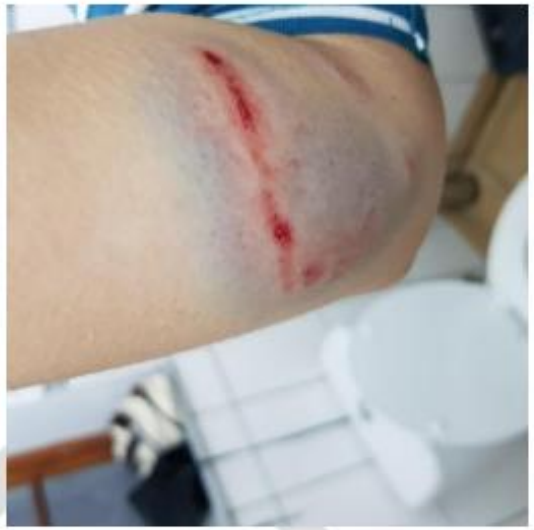
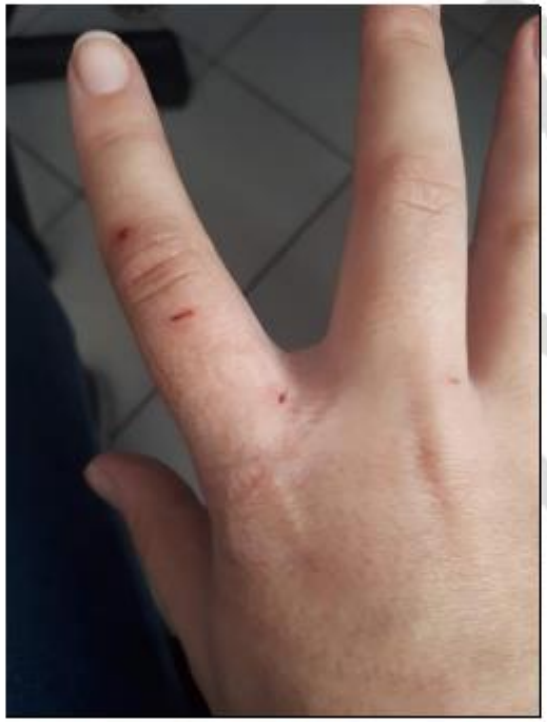
Risk assessment: Wound evaluation





ANY BREACH IN THE SKIN:

CATEGORY 3



Source: National Guidelines for the prevention of Rabies in Humans

Post-exposure prophylaxis (PEP)

PEP is the only intervention for human rabies, and should be considered a life-saving medical treatment for potentially exposed individuals.

PEP = EMERGENCY MANAGEMENT

Post exposure prophylaxis(PEP)

Wash and Flush wounds	• All wounds must be washed and flushed • 5-10 minutes, using soap and running water
Disinfect wound	• Apply chlorhexidine (0.05%) or iodine (10%)
Additional wound treatment	• Tetanus booster vaccine • Antibiotics • Analgesia
Avoid or delay suturing	• Local anaesthetic and suturing may spread the virus locally • Use if urgent haemostasis is required

Source: GARC

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Rabies vaccine

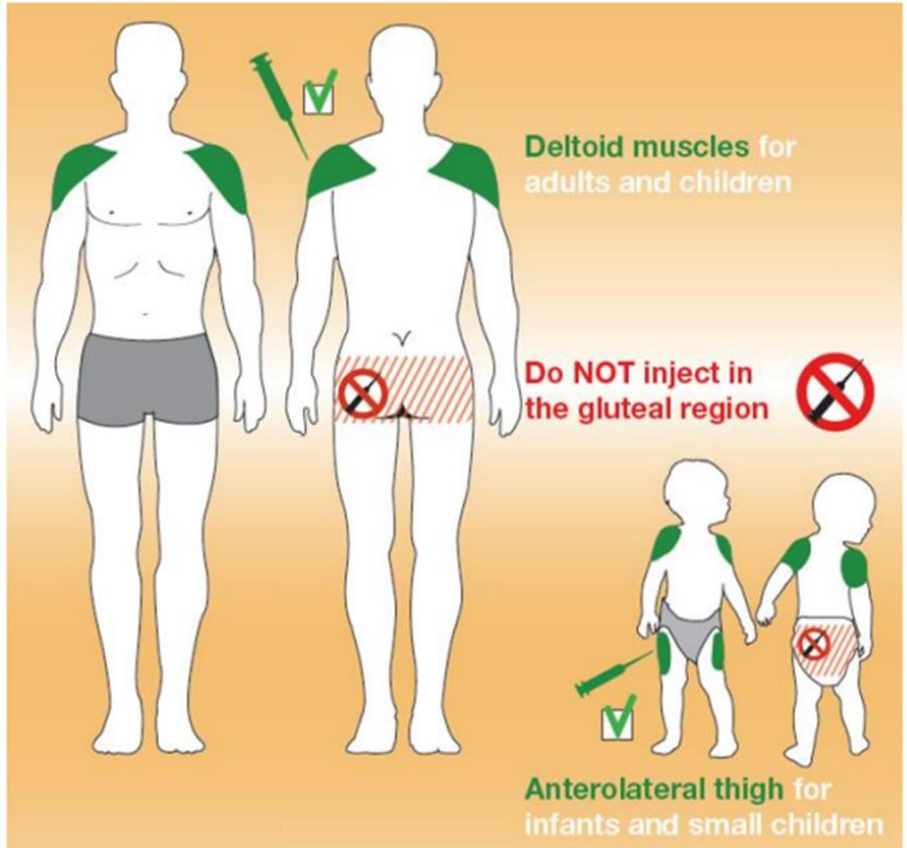
Table 6. Summary of regimen for rabies vaccines available in South Africa

PRODUCT NAME	DOSAGE	SITE OF ADMINISTRATION	SCHEDULE
i. Verorab™ **iii. Chirorab**	0.5 ml (one vial)	Intramuscular. Deltoid muscle in adults, anterolateral thigh in small children (aged < 2 years)*	One dose each on days **0, 3, 7 and any day between day 14 and 28
ii. Rabipur™ *Note: This product is currently not available in SA.*	1.0 ml (one vial)		

* The dosing for both adults and children is the same.

**Day 0 is the day of presentation to a health facility.

- Is available in the public sector.
- Dosing and schedule remain the same as national guidelines for Verorab
- Egg allergy is a consideration

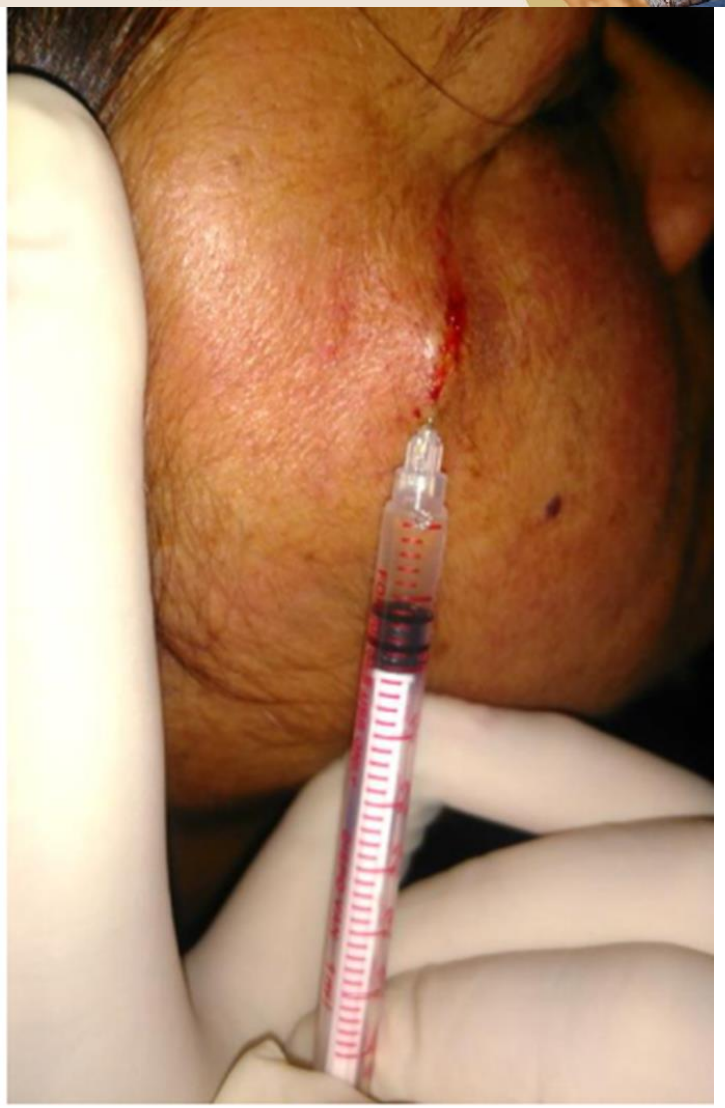


Source: National Guidelines for the prevention of Rabies in Humans, South Africa. National Department of Health, National Institute for Communicable diseases, September 2021

Source: STAKEHOLDER/World%20Rabies%20Day/12_2024-UAR_Gavi_BAbela-1.pdf

Rabies immunoglobulin

- Rabies Immunoglobulin (RIG) is to immediately neutralize the virus at the wound/exposure site.
- Human-derived rabies (HRIG) or equine-derived rabies immunoglobulin (ERIG).
- ERIG: potential for anaphylaxis.
- Vaccine immune response effective - seven days.
- Entire dose of RIG should be infiltrated in or around wound site.



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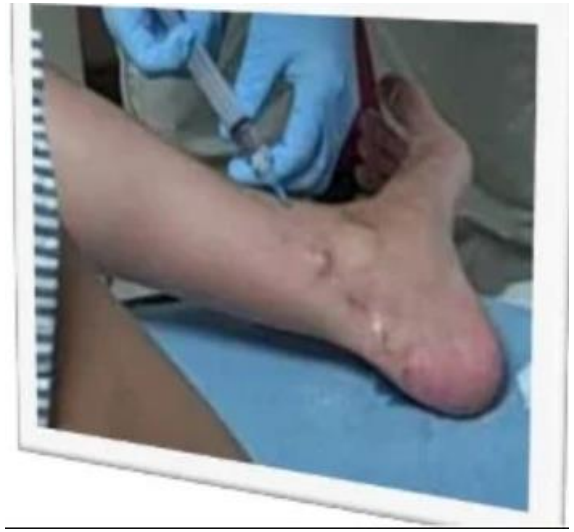

Source: image.slidesharecdn

Table 7. Summary of regimen for HRIG products

PRODUCT NAME	MAXIMUM DOSAGE	DESCRIPTION	SITE OF ADMINISTRATION	SCHEDULE
i. Rabigam®	20 IU/kg bodyweight	150 IU/mL Supplied in a 2 mL vial	Infiltrate up to the maximum calculated dose in and around the wound site/s. For smaller wounds/areas where it is not possible to infiltrate all of the calculated dose, infiltrate as much as is anatomically feasible in and around the wound site/s. See Annexure 2.	On day 0 (when patient presents for first time)/ as soon as possible after exposure to be effective to neutralise virus. When RIG is not available it should be sourced as a matter of urgency. When 7 days have lapsed since initial rabies vaccination, RIG is no longer indicated.
ii. KamRAB®	20 IU/kg bodyweight	150 IU/mL Supplied in 2, 5 and 10 mL vials.		

Table 8. Summary of regimen for ERIG

PRODUCT NAME	MAXIMUM DOSAGE	DESCRIPTION	SITE OF ADMINISTRATION	SCHEDULE
i. Equirab®	40 IU/kg bodyweight	200 IU/mL Supplied in a 5 mL vial.	Infiltrate up to the maximum calculated dose in and around the wound site/s. For smaller wounds/areas where it is not possible to infiltrate all of the calculated dose, infiltrate as much as is anatomically feasible in and around the wound site/s. See Annexure 2.	On day 0 (when patient presents for first time)/ as soon as possible after exposure to be effective to neutralise virus. When RIG is not available it should be sourced as a matter of urgency. When 7 days have lapsed since initial rabies vaccination, RIG is no longer indicated.

Source: National Guidelines for the prevention of Rabies in Humans, South Africa. National Department of Health, National Institute for Communicable diseases, September 2021

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Sample collection

ANTEMORTEM

- Saliva
- CSF
- Nuchal biopsy

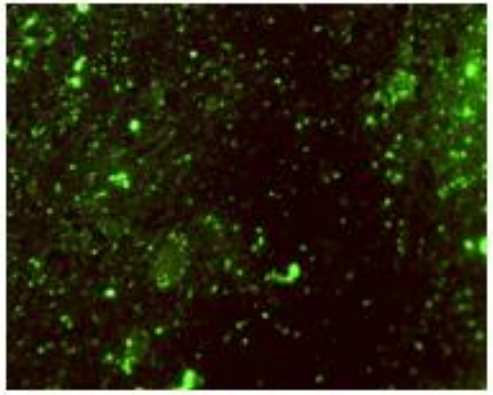
→ RT-PCR

- (Serum)
- CSF

→ Serology: IFA

POSTMORTEM

- Brain → DFA
- Nuchal biopsy → RT-PCR



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Special Viral Pathogens Laboratory: +2711 386 6336 (or +2782 903 9131)
NICD Hotline for Clinical Advice: +27 800 212 552

SUSPECTED HUMAN RABIES CASE HISTORY FORM

Filled in by: _____ Contact number: _____
Date: __/__/____ Information collected from: _____

PATIENT INFORMATION

Name: _____
DOB/Age: _____ Sex: M ☐ F ☐
Address(village name/nearest landmark): _____
Referring physician: _____
Number for physician: _____

CLINICAL FEATURES *Tick appropriate box (yes; no, UNK: unknown)*

Symptom	YES	NO	UNK	Symptom	YES	NO	UNK	Symptom	YES	NO	UNK
Fever	☐	☐	☐	Malaise	☐	☐	☐	Headache	☐	☐	☐
Nausea	☐	☐	☐	Vomiting	☐	☐	☐	Anorexia	☐	☐	☐
Muscle spasm	☐	☐	☐	Dysphasia	☐	☐	☐	Ataxia	☐	☐	☐
Priapism	☐	☐	☐	Seizures	☐	☐	☐	Insomnia	☐	☐	☐
Anxiety	☐	☐	☐	Confusion	☐	☐	☐	Delirium	☐	☐	☐
Hypersalivation	☐	☐	☐	Aerophobia	☐	☐	☐	Hydrophobia	☐	☐	☐
Aggressiveness	☐	☐	☐	Agitation	☐	☐	☐	Hyperactivity	☐	☐	☐
Localized pain/parasthesia	☐	☐	☐	Localized weakness	☐	☐	☐	Autonomic instability	☐	☐	☐

Additional comments: _____
Date of onset: __/__/____ Patient alive? ☐ If Not, Date death: __/__/____

EXPOSURE HISTORY *Tick appropriate box (yes; no; U: unknown)*

YES		NO	UNK
☐	**Patient bitten by animal?**	☐	☐
	If yes, Complete		
	Date of exposure: __/__/____		
	Place of exposure: _____		
	Animal type		
☐	Dog ☐ Cat ☐ Mongoose ☐ Bat ☐ jackal ☐ Other (specify) _____		
☐	Is the animal stray/strange?	☐	☐
☐	Is the animal still alive and healthy?	☐	☐
☐	Has the animal been killed?	☐	☐
☐	Is the animal been tested against rabies?	☐	☐
☐	Is the animal vaccinated against rabies?	☐	☐
	Nature of exposure		
☐	*Multiple bites* ☐ *Single bite* ☐ Scratches		
☐	Licks on broken skin/mucous areas		
☐	Provoked ☐ Unprovoked attack		

Body site: circle affected area/s or describe below

Describe events which led to exposure? _____

PROPHYLAXIS/TREATMENT *Tick appropriate box (yes; no; UNK: unknown)*

YES		NO	UNK
☐	**Patient sought medical care after bite?**	☐	☐
	If Yes, Complete		
	Date of treatment: __/__/____		
	Health facility: _____		
☐	Patient wound treatment given?	☐	☐
☐	Has the victim had antibiotics (specify)? _____	☐	☐
☐	Has the victim had tetanus vaccine	☐	☐
☐	Patient rabies vaccine series given	☐	☐
☐	Dose 1 (d 0) __/__/____	☐	☐
☐	Dose 2 (d 3) __/__/____	☐	☐
☐	Dose 3 (d 7) __/__/____	☐	☐
☐	Dose 4 (d14) __/__/____	☐	☐
☐	Patient Immunoglobulin administered?	☐	☐
☐	**Victim previously completed rabies vaccine?**	☐	☐
	If Yes, Date vaccination: _____		
☐	**Patient is hospitalised?**	☐	☐
	If Yes, Date admission: __/__/____ Hospital: _____		
	Additional comments: _____		

LABORATORY SUBMISSION *Tick if specimen sent for testing*

YES	SPECIMEN	DATE
☐	Saliva	__/__/____
☐	Brain	__/__/____
☐	Nuchal biopsy	__/__/____
☐	CSF	__/__/____

Additional findings: _____

CLINICAL PATHOLOGICAL FINDINGS Complete/attach laboratory reports

YES	TEST	DESCRIBE RESULTS	DATE
☐	WBC:		__/__/____
☐	Protein level:		__/__/____
☐	MRI:		__/__/____
☐			__/__/____
☐			__/__/____
☐			__/__/____

POST COMPLETED FORM WITH SPECIMEN TO:
Special Viral Pathogens Lab, National Institute for Communicable Diseases, National Health Laboratory Service, 1 Modderfontein Road, Sandringham 2192, South Africa

EMAIL COMPLETED FORM TO:
jacquelinew@nicd.ac.za or
naazneenm@nicd.ac.za

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Sample collection guide

Ante mortem testing:

- 3x **saliva** specimens

taken at different time points

OR

- **Cerebrospinal fluid.**

No blood specimens

OR **Nuchal skin biopsy**

Nuchal skin biopsy

Section of skin, 5-6 mm in diameter and ≈5-7 mm depth, must be taken from the nape of the neck (Figure). It is important that specimen contained hair follicles and should be of sufficient depth to include the cutaneous nerves at the base of hair follicles.

1. Collect the skin biopsy. This can be done as an excision or punch biopsy.
2. Moisten a piece of gauze with saline or water.
3. Place the skin biopsy onto, and cover with, a piece of sterile saline-moistened gauze. This keeps the specimen from drying out.
4. Place the gauze with the biopsy into a screw-top container. *No fixative required.*

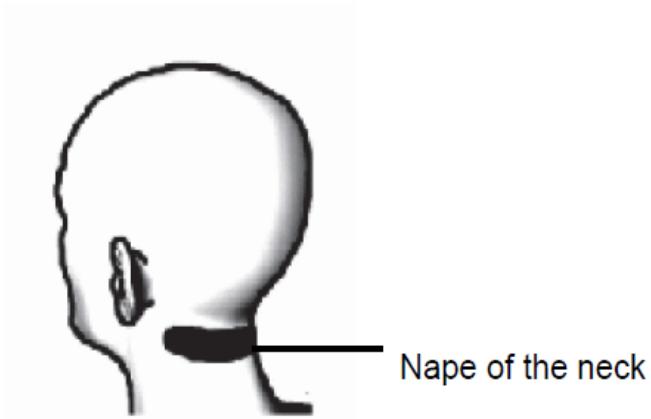

Figure: Location of the nape of the neck

Post mortem testing

- Cross-section of **brain** in glycerol saline /fresh (frozen).
- **No** formalin.

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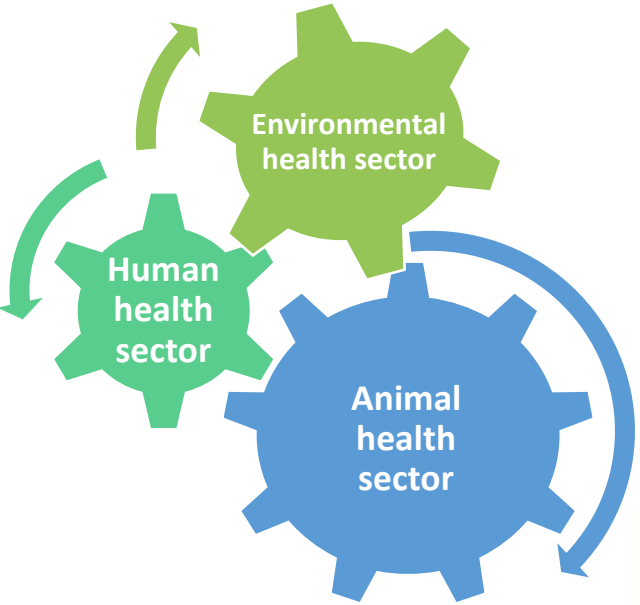
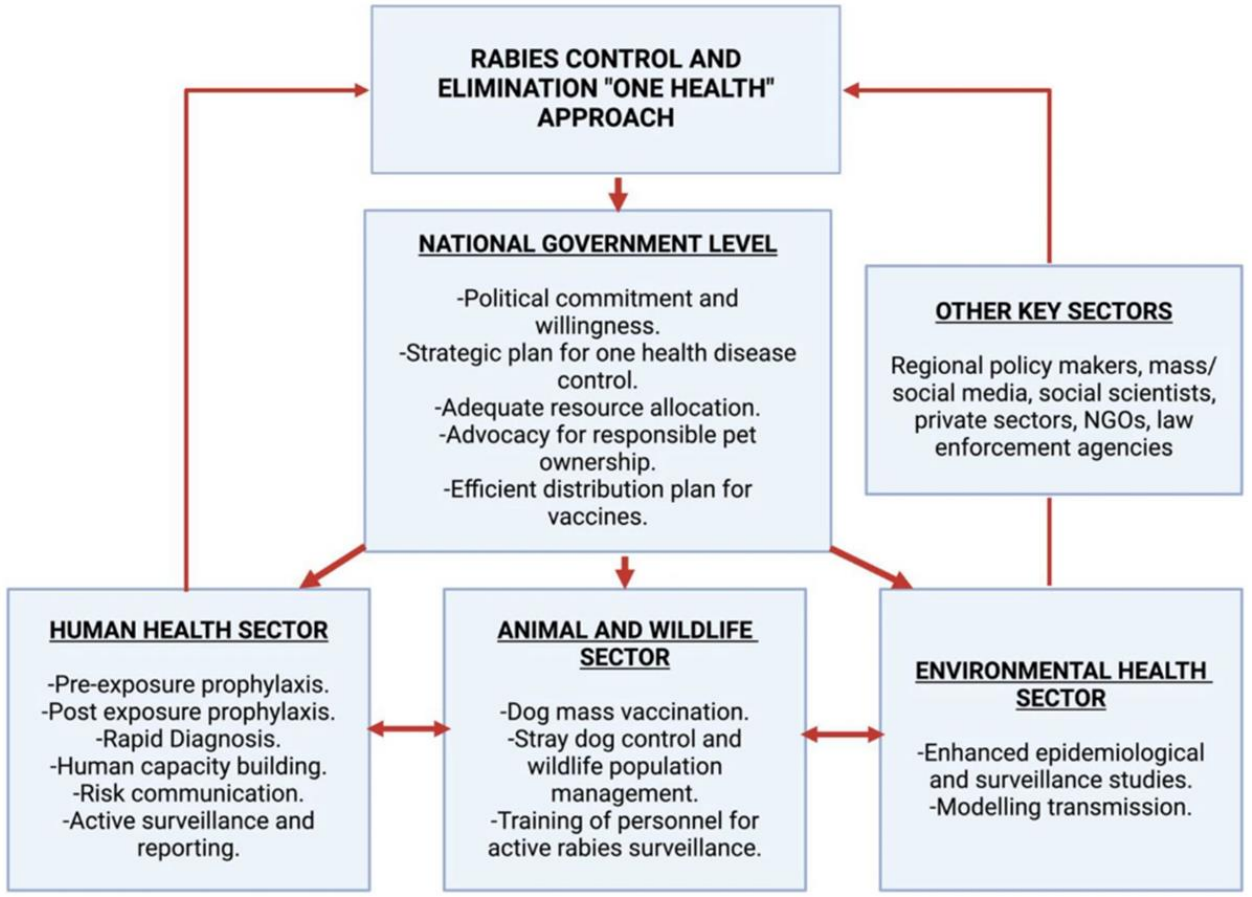
One health approach

Rabies (exposure) case management





Conceptual framework of One Health approach at the national government level. A concerted effort between the animal and wildlife sector, human health sector, and environmental health sector, in collaboration with the national governments of various endemic countries in Africa is essential towards achieving effective rabies control and elimination in 2030. Adapted and modified from (Acharya et al., 2020). Created by Biorender.com

Source: UP Future Africa

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Health worker support

- **NICD Hotline: 0800 212 552**
  - NICD hotline is a dedicated 24-hour support line for healthcare workers,
  - Staffed by experienced NICD clinicians and pathologists.
- **Outbreak response unit email address: outbreak@nicd.ac.za**
  - For all outbreak-related matters

Key messages

Thorough risk assessment

ANY breach in skin= category 3

ACT NOW: Do not delay

PEP = Emergency Management

One Health: VACCINATE your pets

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3. National Rabies Advisory Group
4. Professor Lucille Blumberg

NICD Health Professional Hotline: 0800 212 552
Outbreak Response Unit email: outbreak@nicd.ac.za