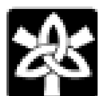
GUIDELINES FOR THE MEDICAL MANAGEMENT OF RABIES IN SOUTH AFRICA



DEPARTMENT OF HEALTH

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ABSTRACT

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Rabies can be transmitted to humans most commonly through the bite of an infected carnivore and causes between 20 to 30 deaths each year in South Africa. Rabies mortality occurs as a result of improper post-exposure treatment, when patients omit to present for the full course of post-exposure treatment or they present themselves for treatment and do not receive the specific anti-rabies prophylaxis. Prompt diagnosis and correct post-exposure treatment is emphasised as the only way to prevent rabies in humans.

These guidelines are issued by the Department of Health.

The objective is to provide all those involved in the treatment of rabies with a clear and practical guide.

The outcome aimed for is higher awareness of rabies resulting in a higher suspicion of rabies infections which would contribute to timeous diagnosis and appropriate post-exposure treatment.

The development of these guidelines was initiated by the Department of Health and the national Rabies Advisory Committee, a committee consisting of experts in the field of rabies. The members of the Rabies Advisory Committee are Dr Neil Cameron, Department of Health (Chairperson); Dr Naeem Bham, Department of Health; Mr George Bishop, Allerton Regional Veterinary Laboratory; Dr Johan Krieger, Department of Agriculture; Ms Danette Lombaard, Department of Health; Dr Rajendra Maharaj, Department of Health; Dr Courtney Meredith, Onderstepoort Veterinary Institute; Dr Marianne More O'Ferrall, Onderstepoort Veterinary Institute; Ms Dianne Phillips, Department of Health; Dr Andrew Robinson, Durban City Health and Prof Robert Swanepoel, National Institute for Virology.

The draft guidelines were also subject to review by the Communicable Disease Control Officers of the nine provinces. The final concept was compiled by Dr Rajendra Maharaj, Directorate for Communicable Disease Control, Department of Health.

The contents deal with the occurrence of rabies in South Africa, the exposure of humans to infection, pre-exposure prophylaxis and post-exposure tratment of rabies, the diagnosis and treatment of patients with rabies, as well as the legal aspects of rabies. Telephone numbers of the rabies information hotline are given. A map illustrating the distribution of the main rabies vectors in South Africa is provided as well as tables containing the categories of exposure to rabies and the dosage of anti-rabies immunoglobulin to be administered according to body weight. Annexures containing information regarding the submission of animal and human brain tissues, the clinical diagnosis of rabies and the availability of vaccines are attached.

These guidelines are endorsed by the Medical Association of South Africa.

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INTRODUCTION

Rabies is primarily a disease of lower animals, but it can be transmitted to humans, most commonly through the bite of an infected carnivore. The disease is currently responsible the deaths of 20 to 30 deaths people each year in South Africa, and with one exception, those who succumbed to the disease over the past decade, did not receive proper post-exposure treatment. The patients either omitted to present for treatment after exposure to infection, or they did not comply with the requirements for the full course of post-exposure immunisation, or else they sought medical attention but did not receive specific anti-rabies prophylaxis. There have only been about 20 instances of vaccine failure among millions of recipients of modern cell culture vaccines worldwide, including one in South Africa. Most cases involved patients in whom treatment was delayed, or who failed to receive immunoglobulin or the full course of treatment, or who had underlying disease.

OCCURRENCE OF RABIES IN SOUTH AFRICA

There are records dating back to the eighteenth century of the suspected occurrence of rabies in dogs and/or humans in South Africa. At present, 600 to 700 cases of rabies are diagnosed in domestic and wild animals each year in South Africa, with dogs, cattle and the yellow mongoose collectively constituting approximately 85% of all animals in which the disease is confirmed. An endemic viverrid form of the disease involving virus adapted to mongoose and genets occurs widely on the interior plateau of the country with the yellow mongoose being the principal vector of the virus (Figure 1). A canid strain of virus is transmitted principally by jackals and dogs in the Northern Province, and by dogs in Mpumalanga, KwaZulu-Natal, and the Eastern Cape. The disease has proved to be particularly difficult to control in the rural and peri-urban settlements of KwaZulu-Natal, where dogs roam freely and civil unrest has hampered vaccination campaigns. The 300 to 400 cases confirmed annually in dogs constitute approximately 90% of all cases of the disease diagnosed in the region, and about 80% of all cases of the disease diagnosed in dogs in South Africa. Furthermore, dog rabies is assuming growing importance in the Eastern Cape and Mpumalanga provinces.

In addition to the mongoose (vivverid) and dog strains of the rabies virus, there are also three so-called rabies-related viruses in Africa: Lagos Bat and Duvenhage viruses, both transmitted by bats, and Mokola virus thought to be transmitted by rodents and shrews. Duvenhage virus has caused a single death in South Africa, and there have been a few cases of rabies-like disease in cats caused by the Lagos Bat and Mokola viruses. The viruses are rare, and chances of acquiring infection from the bite of a bat, rodent or shrew are small. Nevertheless, it must be assumed that exposure to infection has occurred unless laboratory investigation of the animal concerned proves to be negative. No specific antisera and vaccines are available, but there is antigenic cross-reactivity with rabies virus and, therefore, anti-rabies immunoglobulin and vaccine must be used in incidents of potential exposure to infection with a rabies-related virus.

EXPOSURE OF HUMANS TO INFECTION

Because dogs are closely associated with people, they are the most important transmitters of infection to humans worldwide. Over the past five year period, 929% (106/115) of cases of human rabies diagnosed

in South Africa were associated with dog bites in KwaZulu-Natal, mainly involving children under the age of 10 years. The virus is usually present in the saliva of the biting animal from the time of onset of discernable illness onwards, but the efficiency of transmission varies with the severity, location and multiplicity of bites inflicted on the victim. It is estimated that transmission occurs in about 15% of instances on average of rabid dogs biting humans.

Rabies virus does not occur in blood, but spreads along nerves and thus may be present in various organs at the time of death. However, despite reports that people sometimes butcher and consume the carcase of rabid farm animals in South Africa, it has not been recorded that anybody acquired infection in this manner. People who have handled the tissues of rabid animals without protection should nevertheless be regarded as having been exposed to infection.

TREATMENT

PRE-EXPOSURE PROPHYLAXIS

People such as veterinary practitioners , veterinary officials and staff of animal welfare organisations who have occupational risk of exposure to infection, should be advised to undergo preventive pre-exposure immunisation. **This is done at the expense of their employers or themselves**.

One dose of vaccine is administered into the deltoid muscle on each of days 0, 7 and 28 (day 0 being the date on which immunization commences). A single booster dose is given every 2-3 years, and such pre-immunised individuals are given only two boosters after an incident of exposure to infection, on days 0 and 3. No rabies anti-immunoglobulin is administered.

POST-EXPOSURE TREATMENT

Post-exposure treatment is aimed at preventing infection from becoming established in a person who has been bitten by an animal with rabies, through cleaning the bite wound and immunizing the patient. Anti-rabies immunoglobulin is used to provide immediate passive protection and active immunity is stimulated by administering a course of vaccination. There is no effective treatment once a patient develops the disease although a patient should be made as comfortable as possible.

In instances where it is deemed that humans have been exposed to infection, treatment is administered at state expense by certain District Surgeons, hospitals and clinics. The locations where treatment is administered vary with province and with the known prevalence of rabies in the area concerned. **Medical practitioners and other providers of health care are well advised to ascertain what arrangements for treatment of patients prevail in their own areas.** State hospital pharmacists should be able to provide the information. Medical practitioners are at liberty to obtain vaccine and immunoglobulin to treat clients at their own expense in instances where state health officials have deemed that exposure warranting treatment has not occurred, yet the practitioner or client remains concerned.

Determining the risk of exposure to infection

It is the duty of the local veterinary official (State Veterinarian, Animal Health Technician or certain private veterinary practitioners under contract to the state in parts of KwaZulu-Natal) to investigate incidents constituting potential exposure of humans to infection, and to report as soon as possible to the medical personnel responsible for treating the victims. Veterinary officials may rule that a cat or dog which behaves normally after biting people should be confined and kept under observation for a period of 10 days, particularly if the animal has been vaccinated and the incident occurs in an area where rabies is not known to be prevalent. Usually, however, animals suspected to be rabid are killed by members of the public or euthanased by veterinary officials and brain specimens are submitted to a veterinary laboratory responsible for diagnosing rabies (Annexure 1). In all instances involving potential exposure of humans to infection, the laboratories complete diagnostic tests within 24 hours of receiving animal specimens and make the results known by telephone and/or fax to the veterinary official concerned, who asses the information on without delay to the medical personnel responsible for treating the patients.

The interval between exposure and the initiation of treatment must be kept to a minimum and ideally treatment should start on the same day. **Under no circumstances must treatment be delayed pending the availability of a laboratory diagnosis.** Medical personnel responsible for administering treatment should decide immediately whether or not to initiate treatment. Certain key circumstances surrounding the incident should be taken into account, such as the known prevalence of the disease in the area, whether or not the animal concerned exhibited abnormal behaviour, whether it was provoked to attack, whether it had been immunised, and whether it had a history of possible exposure to infection (Annexure 2). In instances If the suspected rabid animal (especially wild animals and strays) cannot be found, caught, is unidentifiable or if the brain is damaged and unsuitable for examination it must be assumed the animal is rabid.

Once it is known, or presumed on the basis of the above criteria, that the animal involved has rabies, then the risk to the patient and the correct course of action to be followed must be categorised according to Table 1.

Wound treatment

Apply wound treatment as soon as possible after a person has been bitten by an animal, whether or not immunoglobulin and vaccine are available. Cleanse and flush the wound thoroughly with copious soapy or clean water, or a surgical preparation for at least five minutes, e.g. 1 in 20 dilution of 5% chlorhexidine or quaternary ammonium compound (Cetrimide®) in water. Apply disinfectant - tincture of iodine, povidone or aqueous iodine (Betadine®, Zepharin®) or 70% alcohol. Avoid suturing if possible. Administer tetanus toxoid adsorbed vaccine (0,5ml intramuscular). Administer antibiotic as considered necessary, for example phenoxymethylpenicillin (Pen VK) 500mg (children 25mg/kg) every 6 hours for 5 days. Administer anti-rabies immunoglobulin as described below.

Human anti-rabies immunoglobulin

Human anti-rabies immunoglobulin is prepared and sold by the National Bioproducts Institute in Pinetown,

KwaZulu-Natal. It is supplied in 2ml ampoules (containing 300 IU antibody), and the dosage is 20 IU/kg body weight. Use Table 2 and the following formula to determine the correct dose:-

Dose (ml) = Body Weight (kg) X 0.13

The anti-rabies immunoglobulin must be administered on day 0 only, that is the day on which treatment is started. The dosage must never be exceeded. Infiltrate all of the dose of anti-rabies immunoglobulin into the depth of and around the wound if anatomically possible. Otherwise administer the remains of the dose by deep intramuscular injection into the buttock.

Vaccines

Rabies vaccines registered for use in this country are purified, inactivated, safe and effective, and can be used in pregnant women and infants. The volume of a dose of rabies vaccine may vary (0,5-1,0ml) with different manufacturers, but all vaccines conform to a fixed potency standard; that is they contain a set minimum amount of virus antigen and can be used interchangeably. The vaccine currently used by state health officials is supplied on tender by the pharmaceutical firm Rhône Poulenc Rorer, from whom supplies may be purchased for own use. The Cold chain practices must be observed in the handling and storage of rabies vaccine and immunoglobulin, and vaccine must be used on the day on which it is reconstituted.

The provincial institutes where vaccines are available are given in Annexure 3.

Immunisation schedules

All persons exposed to rabies should be treated, irrespective of the time elapsed after exposure. The schedule for the administration of the vaccine is given in Flowchart 1.

The vaccine should be administered intramuscularly into the deltoid in adults, and into the anterolateral thigh in infants. **Never inject the vaccine into the buttock.**

The vaccine and antiserum are provided free of charge by the provincial department of health in cases where true exposure is deemed to exist (categories 2 and 3). Any person who wants to have the vaccine despite not having been exposed according to category 2 or 3 may obtain vaccine, but the patient must bear the cost.

DIAGNOSIS AND TREATMENT OF PATIENTS WITH RABIES

DIAGNOSIS

Rabies in humans is diagnosed on the basis of a history of exposure to infection, the occurrence of characteristic signs and symptoms, and the findings in laboratory tests.

The incubation period varies from a few days to several months and occasionally years. Incubation periods seldom exceed 90 days, and in South Africa most fall between 20 and 60 days.

The onset of illness may be marked by a premonitory phase of one to four days during which non-specific signs and symptoms include fever, headache, malaise, sore throat, nausea, anorexia, diarrhoea and fatigue. One to two thirds of patients experience paraesthesia or pain at the site of the infecting bite or in the affected extremity, and there may be intense pruritus leading to frenzied scratching of the wound site. Some patients display characteristic anxiety, irritability, depression and insomnia at this stage.

Patients next enter an acute neurologic or agitated phase, with manic behaviour and hyperactive episodes of running or thrashing about, or undergo convulsive seizures which arise spontaneously or are precipitated by tactile, auditory, visual or olfactory stimuli. In between these episodes patients may be anxious, but lucid and co-operative. They progressively lose the ability to swallow, hyper salivate, and manifest hydrophobia, which is variously ascribed either to painful spasms of the pharynx and larynx, or to clonic contractions of the diaphragm and accessory respiratory muscles, triggered by being offered water to drink. Aerophobia is an analogous reaction which occurs when patients are exposed to a draft of air as, for instance, in being fanned with a sheet of paper. The patients often hyperventilate and develop muscular fasciculations, and occasionally priapism. Their mental state passes through phases of disorientation, hallucinations, confusion, stupor and coma.

Death may occur abruptly after one to 10 days from cardio-respiratory failure, often during a seizure, or paralysis may set in gradually as patients enter coma and develop cluster breathing with apnoeic periods, until finally there is complete cessation of detectable brain activity. Patients may be kept alive for weeks on life support systems, but the vast majority in South Africa are brought to medical attention at a late stage and most succumb within hours or two to three days of admission to hospital.

Five to 20% of patients do not display agitated behaviour, and paralytic signs dominate throughout the illness. Onset of paralysis may be diffuse and symmetrical, or maximal in the extremity where the infection occurred, or be of the ascending Landry type, but progresses until ultimately there is respiratory paralysis.

TREATMENT

Recommendations on the treatment of frank rabies include relieving pain and anxiety through sedation, ensuring hydration and diuresis as indicated, suppressing muscular spasms, and monitoring and correcting intracranial pressure and plasma acid-base balance as necessary. However, the use of life-support systems has been found to be of no avail. Intensive use of vaccine, immunoglobulin, interferon, immunosuppressives and various antiviral drugs have likewise failed. Since there appears to be an immunopathological element to the pathogenesis of the encephalitis, there is a belief that the use of immunoglobulin and vaccine is contra-indicated in frank rabies.

Medical personnel attending rabid patients should wear protective apparel, including goggles, face mask and gloves, and receive post-exposure treatment if there is transdermal or mucous membrane contamination with saliva or other secretions. Disposable items used in treating patients should be incinerated, instruments and other items autoclaved, and fixtures and facilities, including autopsy rooms,

treated with an appropriate disinfectant, such as those containing chlorine or gluteraldehyde.

SPECIMENS FOR LABORATORY DIAGNOSIS

Specimens which can be taken from live patients include saliva for isolation of virus, corneal impression smears (not conjunctival scrapings) and nuchal skin biopsies for immunocytochemical detection of virus antigen, and serum and cerebrospinal fluid for demonstration of an immune response, which only occurs after the onset of symptomatic illness in non-immunised patients, irrespective of the duration of the incubation period.

Persons performing autopsies for suspected rabies should be immunised and wear protective apparel, including an impervious gown and/or apron, gloves and a visor. The autopsies are generally, but not invariably, performed at medicolegal mortuaries. The correct specimens to take are 10-20mm^3 blocks of cerebrum, cerebellum, hippocampus, medulla, thalamus and brain stem, preserved in duplicate in 50% glycerol-saline for virological examination and 10% buffered formalin for histopathological examination. The specimens must be accompanied by details of the case and should be put into sturdy, labelled, leak-proof primary containers (screw top jars). These containers should be packed in rigid secondary containers (metal or plastic) with sufficient absorbent material (sawdust or paper) to soak up the entire liquid contents in the event of leakage, and these must in turn be placed in a strong tertiary container (wooden box or fibre carton). The parcel should be sealed and dispatched expeditiously to the laboratory, usually through a courier service.

All specimens for the diagnosis of rabies in humans must be submitted to the National Institute for Virology in Johannesburg (Annexure 1). The tests performed are similar to those described for veterinary laboratories above, and a preliminary report on the findings is made per telephone to the sender. In the event that a death is confirmed to be due to rabies, the written report is accompanied by an affidavit which must be handed to the police officer responsible for investigating the case.

LEGAL ASPECTS OF RABIES

CONFIRMATION OF THE DIAGNOSIS

Deaths suspected to be due to rabies are classified as resulting from unnatural causes, and hence are subject to forensic investigation. An autopsy must be performed to establish the diagnosis unless rabies has been confirmed during life. Although it is important to explain the need for an autopsy to relatives of the patient, and to obtain their consent, in terms of the Human Tissue Act, Act 65 of 1983, a magistrate or medical practitioner in charge of the institution concerned may grant authority for the autopsy to be performed.

NOTIFICATION OF RABIES

According to Regulation 328 promulgated under the Health Act (Act No. 63 of 1977), rabies is a notifiable disease. Incidents of human exposure to infection, frank cases of disease and deaths from rabies should

be notified to the provincial department of health on the prescribed form (GW 17/5).

RABIES INFORMATION HOTLINE TELEPHONE SERVICE

Anybody, including members of the public, can obtain advice on various aspects of the disease at one of the rabies information hotline telephone numbers given below. Primary health care workers **should not** deviate from any of the above recommendations or dosage schedules. After proper consultation with an expert on a hotline, medical staff at referral centres may use reduced dosage schedules of vaccination and a non-intramuscular route of administration in certain unusual circumstances only.

KwaZulu-Natal

Pasteur Merieux Rabies Hotline
(031) 360-3111

Rest of South Africa
Medical advice:
National Institute for Virology, Johannesburg
(011) 882-9910

After hours
(011) 882-9910 for recorded message with telephone number of medical virologist on call.

Veterinary advice:
Onderstepoort Veterinary Institute
(012) 529-9111
After hours dial (012) 529-9111 and ask for home number of veterinary official on call.

TABLE 1: CATEGORY OF EXPOSURE TO RABIES.

RISK CATEGORY	TYPE OF EXPOSURE	ACTION TO BE TAKEN
1	Touching/feeding animal. Licking of intact skin.	Nil if history is reliable. If history is not reliable, treat as for category 2.
2	Nibbling of uncovered skin. Superficial scratch, no bleeding. Licking of broken skin.	Apply wound treatment. Administer vaccine. **Do not administer anti-rabies immunoglobulin**. Stop vaccination if animal is rabies negative in laboratory tests, or remains healthy after 10 days observation (dog or cat).
3	Bites/scratches which penetrate the skin and draw blood. Licking of mucous membranes.	Apply wound treatment. Administer vaccine. **Administer anti-rabies immunoglobulin.** Administer anti-tetanus and antibiotic treatment. Stop vaccination if animal is rabies negative in laboratory tests, or remains healthy after 10 days observation (dog or cat).

TABLE 2: THE DOSAGE OF ANTI-RABIES IMMUNOGLOBULIN TO BE ADMINISTERED ACCORDING TO BODY WEIGHT.

Body Weight (kg)	Dose (units)	Dose (ml)
5	100	0.7
10	200	1.3
15	300	2.0
20	400	2.7
25	500	3.3
30	600	4.0
40	800	5.3
50	1 000	6.7
60	1 200	8.0
70	1 400	9.3
80	1 600	10.7
90	1 800	12.0
100	2 000	13.3

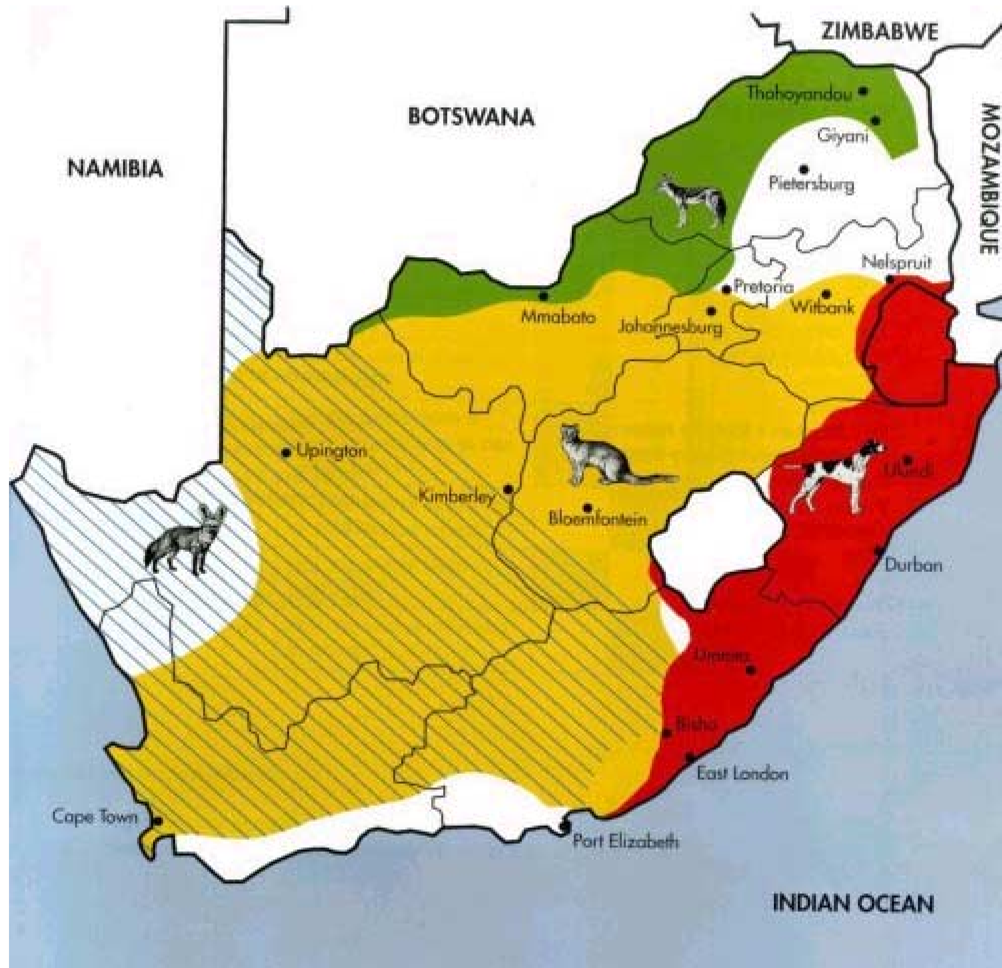


Figure 1. The distribution of rabies in its primary vectors in South Africa.

Annexure 1

LABORATORIES FOR RABIES DIAGNOSIS

ANIMAL SAMPLES

KWAZULU-NATAL
Mr G Bishop
Allerton Veterinary Laboratory
Private Bag X2
CASCADES
3202

Tel.: (0331) 47-1931
Fax.: (0331) 47-1633

GAUTENG
Dr C Meredith / Mr C de Koker
Onderstepoort Veterinary Institute
OIE Rabies Reference Centre
Private Bag X5
ONDERSTEPOORT
0110

Tel.: (012) 529-9440/39
Fax.: (012) 529-9390

EASTERN CAPE
Dr G Akol
Umtata Veterinary Laboratory
Private Bag X5002
UMTATA
(former Transkei)

Tel.: (0471) 2-6752
Fax.: (0471) 2-6752 ask for fax

HUMAN SAMPLES

Prof R Swanepoel
National Institute of Virology
Private Bag X4
SANDRINGHAM
Gauteng
2131

Tel.: (011) 882-9910
Fax.: (011) 882-0596

Annexure 2

RABIES RISK ASSESSMENT

When presented with a patient (clinically or telephonically), complete the following questionnaire to guide your management:

		YES	NO	??			YES	NO	??
1	Is rabies prevalent now in the area where the bite took place?				4	Has the animal been vaccinated against rabies?			
2	Was the animal abnormal in any way?				5	Has the animal been destroyed?			
3	Did the animal have a history of exposure to possible infection?				6	Was the animal provoked to attack?			

If any shaded block is marked:

1. Start treatment immediately
2. Report incident to the local veterinary official in area of jurisdiction.

SIGNATURE OF PATIENT/GUARDIAN:..DATE:......./...../......

Annexure 3

AVAILABILITY OF VACCINES

PROVINCE: EASTERN CAPE

INSTITUTION	DEPARTMENT WHERE STORED	MEDICAL SUPERINTENDENT'S TELEPHONE NO.	CONTACT PERSON & TELEPHONE NO.
All Saints Hospital ENGCOBO	Pharmacy	0837015110 or (0472) 48-1113/6	Pharmacist (0472) 48-1113/6
Canzibe Hospital NGQELENI	Dispensary	Dr Schrooder (0471) 2-5571 or 0832292052	S P Mniki (0471) 2-5571
Madwaleni Hospital MADWALENI	Dispensary	(0471) 31-1137 ext. 225/226	Ms Biltane (0417) 31-1137 X 235/6
Mjanyana Hospital MJANYANA	Matron's Office	(0471) 2-4496	Community Matron
St Lucy's Hospital TSOLO	Drug Stores	Dr Sendyrose (0471) 2-6259	Ms Mkula (0471) 2-6259
St Barnabas Hospital LIBODE	Dispensary	(0471) 2-4271	Mr Dlamini or Mr Mdutyana (0471) 2-4271 X 232
Umtata General Hospital UMTATA	Pharmacy Department	(0471) 31-2658/301-3320	Casualty Staff (0471) 301-3318
Zithulele Hospital MQANDULI	Dispensary	047312 ask for ZITHULELE 8	Ms Lutlukeng 047312 ask for ZITHULELE 8

PROVINCE: FREE STATE

INSTITUTION	Department STORED	MEDICAL SUPERINTENDENT'S TELEPHONE NO.	CONTACT PERSON & TELEPHONE NO.
National Hospital BLOEMFONTEIN	Pharmacy Stores	(051) 405-1911 (Page Pharmacist on call after hours)	Ms KM Jacobs (051) 405-2543
Pelonomi Hospital BLOEMFONTEIN	Emergency Medicines Room Emergency Dept. Pharmacy Stores	(051) 405-1911 (Page Pharmacist on call after hours)	Mr FV v/d Walt (051) 405-1309
Universitas Hospital BLOEMFONTEIN	Emergency Dept. Pharmacy	(051) 405-3911 (051) 405-3556/7 (Page Pharmacist on call after hours)	Ms TP Oosthuizen (051) 405-3467
Phekolong Hospital BETHLEHEM	Pharmacy	(058) 303-5331 (Page Pharmacist on call after hours)	Ms EA Helmand (058) 303-5331 X 210
Boitumelo Hospital KROONSTAD	Pharmacy	(0562) 52-113 (Page Pharmacist on call after hours)	Ms G Kapp (0562) 52-113 X 2155
Voortrekker Hospital ROONSTAD	Pharmacy	(0562) 22-271 (Page Pharmacist on call after hours)	Ms RH v/d Walt (0562) 22-271 X 140

PROVINCE: GAUTENG

INSTITUTION	DEPARTMENT WHERE STORED	MEDICAL SUPERINTENDENT'S TELEPHONE NO.	CONTACT PERSON & TELEPHONE NO.
District Surgeon's Office JOHANNESBURG	District Surgeon's Office	Dr Krausoy (011) 720-2560	Dr Krausoy (011) 720-2560
Baragwanath Hospital JOHANNESBURG	Pharmacy Casualty	Dr C v Heerden (011) 933-8000	Snr Pharmacist Dr in Casualty (011) 933-8000
Rietfontein Hospital JOHANNESBURG	Pharmacy Emergency Ward Casualty	Dr IJ Joubert (011) 882-9810	Pharmacist & Dr on Duty (011) 882-9810
Johannesburg Hospital JOHANNESBURG	Pharmacy Ward 165 Casualty	Dr T Frankish (011) 488-4911	Chief/Snr Pharmacist or Pharmacist on Duty Dr in Casualty (011) 488-4911
District Surgeon's Office PRETORIA	District Surgeon's Office	Dr K Muller (012) 322-1580	Dr K Muller (012) 322-1580
Garankuwa Hospital PRETORIA	Pharmacy Casualty	Dr C Broekman (012) 529-3111	Pharmacist (012) 529-3681 Dr in Casualty (012) 529-3111
H F Verwoerd Hospital PRETORIA	Pharmacy Casualty	(012) 354-1000	Snr Pharmacist (012) 354-1829 Dr in Casualty (012) 354-1829

PROVINCE: KWAZULU-NATAL

INSTITUTION	DEPARTMENT WHERE STORED	MEDICAL SUPERINTENDENT'S TELEPHONE NO.	CONTACT PERSON & TELEPHONE NO.
Addington Hospital	Pharmacy Casualty	(031) 32-2111	(031) 32-2111 Pharmacy/Casualty
Appelsbosch Hospital	Pharmacy Casualty	(033) 572 ask for 2	(033) 572 ask for 2 Pharmacy/Casualty
Assisi Hospital	Pharmacy Casualty	(039) 695-9106	(039) 695-9106 Pharmacy/Casualty
Benedictine Hospital	Pharmacy Casualty	(0358) 31-0314	(0358) 31-0314 Pharmacy/Casualty
Catherine Booth Hospital	Pharmacy Casualty	(0353) 31-1449	(0353) 31-1449 Pharmacy/Casualty
Ceza Hospital	Pharmacy Casualty	(0358) 32-0001	(0358) 32-0001 Pharmacy/Casualty
Christ the King Hospital	Pharmacy Casualty	(0336) 34-2067	(0336) 34-2067 Pharmacy/Casualty
Church of Scotland Hospital	Pharmacy Casualty	(0341) 93-0004	(0341) 93-0004 Pharmacy/Casualty
Clairwood Hospital	Pharmacy Casualty	(031) 42-2221	(031) 42-2221 Pharmacy/Casualty
Dundee Hospital	Pharmacy Casualty	(0341) 2-1111	(0341) 2-1111 Pharmacy/Casualty
East Griqualand & Usher Memorial Hospital	Pharmacy Casualty	(037) 727-2050	(037) 727-2050 Pharmacy/Casualty
Edendale Hospital	Pharmacy	(0331) 95-4911	(0331) 95-4911

	Casualty		Pharmacy/Casualty
Emmaus Hospital	Pharmacy Casualty	(036) 488-1570	(036) 488-1570 Pharmacy/Casualty
Eshowe Hospital	Pharmacy Casualty	(0354) 4-2071	(0354) 4-2071 Pharmacy/Casualty
Estcourt Hospital	Pharmacy Casualty	(0363) 2-2100	(0363) 2-2100 Pharmacy/Casualty
G J Crookes Hospital	Pharmacy Casualty	(0323) 2-1300	(0323) 2-1300 Pharmacy/Casualty
Grey's Hospital	Pharmacy Casualty	(0331) 45-8181	(0331) 45-8181 Pharmacy/Casualty
Greytown Hospital	Pharmacy Casualty	(0334) 3-1111	(0334) 3-1111 Pharmacy/Casualty
Itshelejuba Hospital	Pharmacy Casualty	(017821) 833	(017821) 833 Pharmacy/Casualty
King Edward Hospital	Pharmacy Casualty	(031) 360-3111	(031) 360-3111 Pharmacy/Casualty
Ladysmith Hospital	Pharmacy Casualty	(0361) 2-2111	(0361) 2-2111 Pharmacy/Casualty
Lower Umfolozi & District War Memorial Hospital	Pharmacy Casualty	(0351) 2-1111	(0351) 2-1111 Pharmacy/Casualty
Madedeni Hospital	Pharmacy Casualty	(03431) 4-9221	(03431) 4-9221 Pharmacy/Casualty
McCord Hospital	Pharmacy Casualty	(031) 207-1515	(031) 207-1515 Pharmacy/Casualty
Montebello Hospital	Pharmacy Casualty	(033) 506-0102	(033) 506-0102 Pharmacy/Casualty
Murchison Hospital	Pharmacy Casualty	(039) 687-7311	(039) 687-7311 Pharmacy/Casualty
Newcastle Hospital	Pharmacy Casualty	(03431) 2-1111	(03431) 2-1111 Pharmacy/Casualty
Ngwelezana Hospital	Pharmacy Casualty	(0351) 94-2311	(0351) 94-2311 Pharmacy/Casualty
Nkandla Hospital	Pharmacy Casualty	(0558) 33-0012	(0558) 33-0012 Pharmacy/Casualty
Nkonjeni Hospital	Pharmacy Casualty	(0358) 873-0013	(0358) 873-0013 Pharmacy/Casualty
Northdale Hospital	Pharmacy Casualty	(0331) 7-2512	(0331) 7-2512 Pharmacy/Casualty
Osindisweni Hospital	Pharmacy Casualty	(0322) 33-2121	(0322) 33-2121 Pharmacy/Casualty
Port Shepstone Hospital	Pharmacy Casualty	(0391) 2-1111	(0391) 2-1111 Pharmacy/Casualty
Prince Mshiyeni Memorial Hospital	Pharmacy Casualty	(0358) 873-0013	(031) 907-8111 Pharmacy/Casualty
R K Khan Hospital	Pharmacy Casualty	(031) 43-3223	(031) 43-3223 Pharmacy/Casualty
St Andrew's Hospital	Pharmacy Casualty	(039433) 1955	(039433) 1955 Pharmacy/Casualty
St Apollinaris Hospital	Pharmacy Casualty	(0336) 33-1055	(0336) 33-1055 Pharmacy/Casualty
St Mary's, Marionhill	Pharmacy	(031) 700-3371	(031) 700-3371

Hospital	Casualty		Pharmacy/Casualty
St Mary's, Melmoth Hospital	Pharmacy Casualty	(03545) 2071	(03545) 2071 Pharmacy/Casualty
Stanger Hospital	Pharmacy Casualty	(0324) 2-2222	(0324) 2-2222 Pharmacy/Casualty
Tayler Bequest Hospital	Pharmacy Casualty	(0373) 3107	(0373) 3107 Pharmacy/Casualty
Untunjambili Hospital	Pharmacy Casualty	(03344) 4-1818	(03344) 4-1818 Pharmacy/Casualty
Vryheid Hospital	Pharmacy Casualty	(0381) 81-2111	(0381) 81-2111 Pharmacy/Casualty

PROVINCE: MPUMALANGA

INSTITUTION	DEPARTMENT WHERE STORED	MEDICAL SUPERINTENDENT'S TELEPHONE NO.	CONTACT PERSON & TELEPHONE NO.
Lowveld Pharmaceutical Depot	Depot		MR Y Mashego (013) 752-2786
Rob Ferreira Hospital NELSPRUIT	Dispensary	(013) 741-3031	Ms A Crous (013) 741-3031 X 340
Shongwe Hospital MALELANE	Dispensary	(013) 781-0219	Mr D Swanepoel or Ms S Mashabane (013) 781-0219
Themba Hospital WHITE RIVER	Dispensary	(013) 796-0201	Mr G Mashile or Mr S Malele (013) 796-0201
Embhuleni Hospital BADPLAAS	Dispensary	(017) 883-0093	Dr Chundu (017) 883-0093

PROVINCE: NORTHERN CAPE

INSTITUTION	DEPARTMENT WHERE STORED	MEDICAL SUPERINTENDENT'S TELEPHONE NO.	CONTACT PERSON & TELEPHONE NO.
North West District Board, CALVINIA	Clinic		Ms E Wentworth (0273) 41-1080
Voortrekker Hospital CALVINIA	Casualty		Ms M Langner (0273) 41-1205
Carnavon Hospital CARNAVON	Casualty		Ms E Burger (02032) 36
Carnavon Municipality CARNAVON	Kareeberg Clinic		Sister N van Rensburg (02032) 12
Colesberg Hospital COLESBERG	Colesberg Hospital		Ms Hattingh (051) 753-0771
Municipal Clinic DE AAR	Casualty Department		Ms van der Schyff (05363) 6-0927
Dibeng Clinic DIBENG	Main Depot Kuruman Hospital		Sister J Coetzee (05379) 216
Kuruman Hospital KURUMAN	Main Depot Kuruman Hospital		Ms P J Myburgh (05373) 3-0044
Olifantshoek Clinic	Main Depot		Sister M Snyman

OLIFANTSHOEK	Kuruman Hospital		(059512) 148
Postmasburg Clinic POSTMASBURG	Clinic		Sister M Korsten (0591) 7-1794
Drs. Smith, Pieterse & Schoeman PRIESKA	Consulting Rooms		Drs Smith, Pieterse & Schoeman (0594) 3-1133
Sutherland Hospital SUTHERLAND	Casualty		Sister J Esterhuizen (02392) 2
Van Zylsrus Clinic VAN ZYLSRUS	Main Depot Kuruman Hospital		Ms E van Wyk (05378) 295
North West District Board, WILLISTON	Clinic		Ms E Wentworth (0273) 41-1080
Williston Hospital WILLISTON	Casualty		Sister A Smit

PROVINCE: NORTHERN PROVINCE

INSTITUTION	DEPARTMENT WHERE STORED	MEDICAL SUPERINTENDENT. TELEPHONE NO.	CONTACT PERSON & TELEPHONE NO.
Tintswalo Hospital ACORNHOEK		Dr Pienaar (0137) 97-0000	
Alldays Community Health, ALLDAYS		(01554) 289	(01554) 289
Blouberg Hospital BOCHUM			Ms Maja (Matron) (0152272) 35
Helene Franz Hospital BOCHUM		Dr Meyer (0152272) 43	
Mapulaneng Hospital BUSHBUCKRIDGE		Dr SZYNAL (01319) 4-0212/6	Ms Tsagane(MATRON) (01319) 4-0212/6
Duiwelskloof Hospital DUIWELSKLOOF		Dr Coertzen (01523) 9241-2	
Botlokwa Health Centre, DWARSRIVER		MS M Thobakgale (015527) 0023	
Elim Hospital ELIM		Dr Maritz (015) 556-3201	
Ellisras Hospital ELLISRAS		Dr Bouwer (014) 763-2227	
Witpoort Health Centre, ELLISRAS		Ms M J Lefawane (Matron) (014) 769-0025	Ms MJ Lefawane (Matron) (014) 769-0025
Kgapane Hospital GA-KGAPANE		Dr Kapanga (0152) 328-3506	Ms Mavangwa (Matron) (0152) 328-3511
Nkhensani Hospital GIYANI		Dr Mkondo (0158) 2-3251	Mr Shakoane (Matron) (0158) 2-3251
St Rita's Hospital GLEN COWIE		Dr Ndjeka (0132) 98-1000/4	Ms Malekane (Matron) (0132) 98-1000/4
Dr M M M Hospital GROOTHOEK		Mr Ramonyanai (015) 642-3132	MR Matabane (Matron) (015) 642-3132
Jane Furse Hospital JANE FURSE		Dr Khai (0132) 65-1000	MS Mokgabudi (Matron) (0132) 65-1000
Letaba Hospital		Dr Ncube	Ms Maluleke(Matron)

LETABA		(0152) 303-1711	(0152) 303-1711
W F Knobel Hospital LONSDALE		Dr Moloi (01522392) 2	
Louis Trichardt Hospital LOUIS TRICHARDT		Dr Moolman (01551) 6-0148	Ms Botha (Matron) (01551) 6-0148
Siloam Hospital LOUIS TRICHARDT		(01595) 3-0004	(01595) 3-0004
H C Boshoff Hospital MAANDAGSHOEK		Dr James (01323) 9660/1	Ms Mampuru(Matron) (01323) 9660/1
Malamulele Hospital MALAMULELE		Dr Wasilota (015) 851-0026	
Matlala Hospital MARBLE HALL		Dr Mpoyi (0020) TSIMANYANE 3	
Messina Hospital MESSINA		Dr van der Walt (01553) 2313	Ms Helsdingen (Matron) (01553) 2313
Matikwane Hospital MKHUHLU		(01318) 8-6024	(01318) 8-6024
Maphutha-L-Malatji Hospital AMAKGALE		Dr Takowski (01524) 69-1520	Ms Nkoenyana(Matron) (01524) 69-1520
F H Odendaal Hospital NYLSTROOM		Dr Anderson (014) 70-2262	Ms Fourie (Matron) (014) 70-2262
Phalaborwa Hospital PHALABORWA		Dr Vonselen (01524) 5511	Ms S Rossouw(Matron) (01524) 5511
Pietersburg Hospital PIETERSBURG		Dr Moolman (0152) 2973163	
St Joseph's Hospital PIETERSBURG		Sister C M Lievens (0020) SETOTOLWANE 8	
Mokopane Hospital POTGIETERSRUS		Dr Ntlhane (0154) 483-0331-6	Ms Lamola (Matron) (0154) 483-0331-6
Voortrekker Hospital POTGIETERSRUS		Dr van der Merwe (0154) 2236	Ms Human (Matron) (0154) 2236
Seshego Hospital SESHEGO		Dr Bohra (0152) 232-1141	Ms Dambuza (Matron) (0152) 232-1141
Tshilidzini Hospital SHAYANDIMA		Dr Linda Naude (0159) 4-1061	Ms K Malwana (Matron) (0159) 4-1061
Mankweng Hospital SOVENGA		Dr Rajan (0152) 267-0330-11	Ms Magagane (Matron) (0152) 267-0330-11
ST VINCENT Hospital ST VINCENT		Dr E Coertzen (014) 736-2310	
George Masebe Hospital SUSWE		Dr Malebe (0152) 295-9056	Ms Ranaka (Matron) (0152) 295-9056
Thabazimbi Hospital THABAZIMBI		Dr Blom (0153) 2-1223	
Sekororo hospital TRICHARDTSDAL		Dr Moembo (0152302) 6/7	
Dr C N Phatudi Hospital TZANEEN		Dr Kiapway (0152) 355-3432/3	Mr Mapheto (Matron) (0152) 355-3432/3
Shiluvana Hospital TZANEEN		(0152) 355-3438	
Van Velden Memorial Hospital		Dr Erica Coertzen (0152) 307-4475	Ms R Joubert(Matron) (0152) 307-4475

TZANEEN			
Donald Frazer Hospital VHUFULI, VENDA		(0159) 82-4051/3	(0159) 82-4051/3
Warmbaths Hospital WARMBATHS		Dr Petzer (014) 736-2121	Ms Kriel (Matron) (014) 736-2121

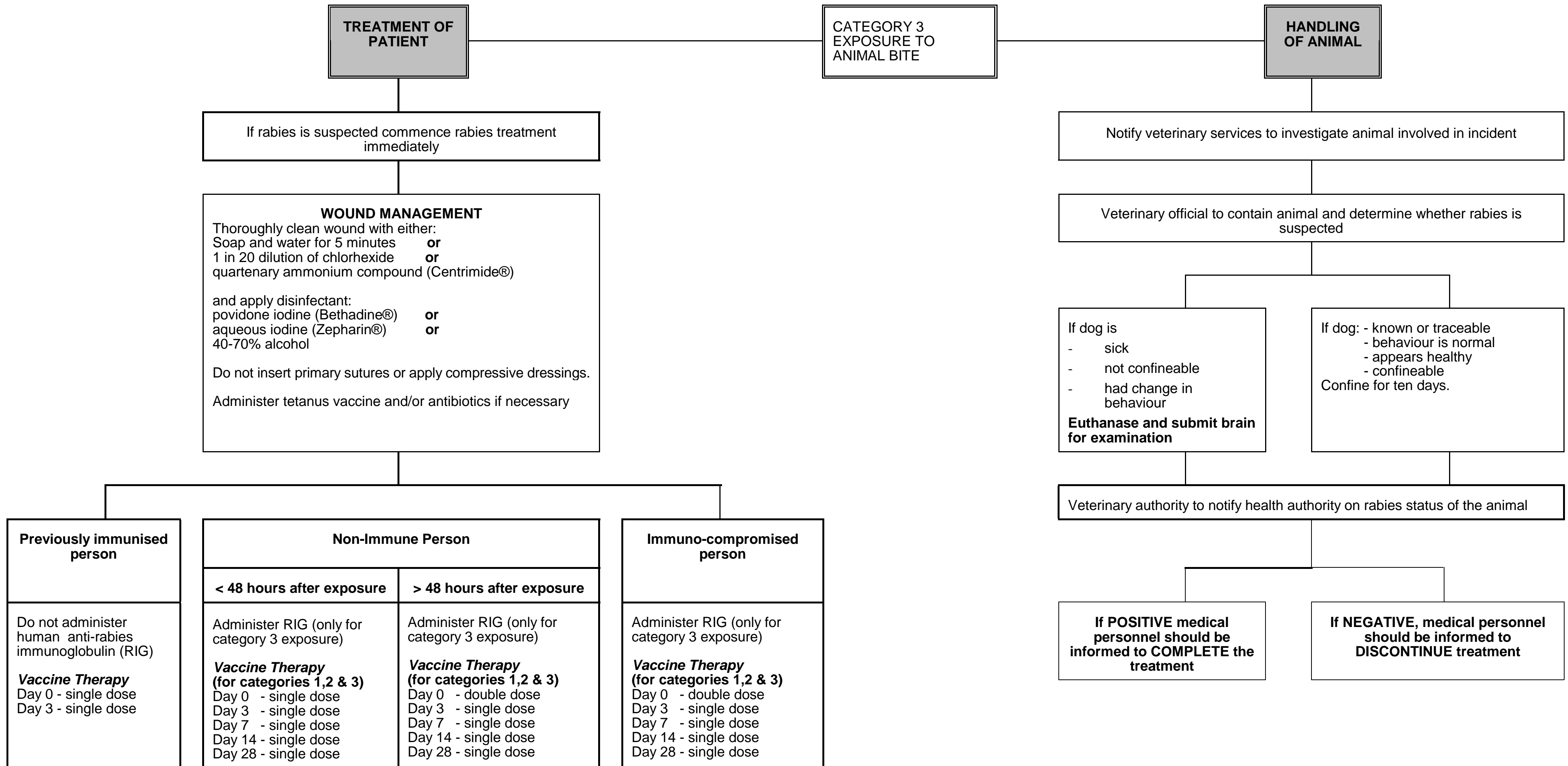
PROVINCE: NORTH-WEST PROVINCE

INSTITUTION	DEPARTMENT WHERE STORED	MEDICAL SUPERINTENDENT'S TELEPHONE NO.	CONTACT PERSON & TELEPHONE NO.
Bray Hospital BRAY	Casualty	Dr Barnard 0020 ask for BRAY 1	Ms Barnard (Matron) 0020 ask for BRAY 1
Bophelong Hospital BOPHELONG	Casualty	Ms Selebano (Matron) (0140) 83-2005/6	Ms Mokgatla (Pharmacist) (0140) 83-2005/6
George Stegman Hospital RUSTENBURG	Casualty	MS Motaaji (Matron) (01465) 6-1774	Ms Ndlovu (Pharmacist) (01465) 6-1774
Klerksdorp Hospital KLERKSDORP	Casualty	Ms Kruger (Matron) (018) 462-1131	Ms van Reenen (Pharmacist) (018) 462-1131
Lehurutshe Hospital LEHURUTSHE	Casualty	Ms Hlahla (Matron) (0140) 63-3505/6	Mr T Mphaka (Chief Pharmacist) (0140) 63-3505/6
ODI Hospital MABOPANE	Casualty	Mr Ntsimane (Matron) (01461) 2-2287/75	Ms Jordan (Chief Pharmacist) (01461) 2-2287/75
Paul Kruger Memorial Hospital RUSTENBURG	Casualty	Ms Wenhold (Matron) (0142) 2-2112	Ms Nstimane(Snr Pharmacist) (0142) 2-2112
Potchefstroom Hospital POTCHEFSTROOM	Casualty	Ms De Beer (Matron) (0148) 297-7011	Ms Uys(Senior Pharmacist) (0148) 297-7011
Tshwaragano Hospital TSHWARAGANO	Casualty	Ms Mogodi (Matron) (01404) 4-1780/1/2	Ms Motlatsi (Pharmacist Assistant) (01404) 4-1780/1/2
Vryburg Hospital VRYBURG	Casualty	Ms Kruger (Matron) (05391) 2121	

PROVINCE: WESTERN CAPE

INSTITUTION	DEPARTMENT WHERE STORED	MEDICAL SUPERINTENDENT'S TELEPHONE NO.	CONTACT PERSON & TELEPHONE NO.
District Surgeon's Office BELLVILLE	District Surgeon's Office		District Surgeon (021) 948-4081/2
District Surgeon's Office BEAUFORT WEST	District Surgeon's Office		District Surgeon (0201) 2171
District Surgeon's Office CAPE TOWN	District Surgeon's Office		District Surgeon (021) 45-1631
George Hospital GEORGE	Pharmacy Department	(0441) 74-5122	Pharmacist In Charge (0441) 74-5122

Swartland Hospital MALMESBURY	Pharmacy Department	(0244) 2-1161	Pharmacist in Charge (0224) 2-1161
Groote Schuur Hospital OBSERVATORY	Emergency Dispensary	(021) 404-9111	Chief Pharmacist (021) 404-3216
Paarl Hospital PAARL	Emergency Dispensary	(021) 872-1711	Pharmacist in Charge (021) 872-1711
Hottentots Holland Hospital SOMERSET WEST	Emergency Dispensary	(021) 852-1334	Pharmacist in Charge (021) 852-1334
Swellendam Hospital SWELLENDAM	Pharmacy Department	(0291) 4-1141	Pharmacist Protea Pharmacy TEL(0291) 4-1142/4-2020
Tygerberg Hospital TYGERBERG	Emergency Dispensary	(021) 938-4911	Chief Pharmacist (021) 938-4619
{PRIVATE}Vredenburg Hospital VREDENBURG	Pharmacy Department	(02281) 3-1263	Pharmacist In Charge (02281) 3-1261
Eben Donges Hospital WORCESTER	Pharmacy Department	(0231) 2-1070	Pharmacist In Charge (0231) 2-1070
District Surgeon's Office WYNBERG	District Surgeon's Office		District Surgeon (021) 797-5563



FLOWCHART 1. SUMMARY OF THE MEDICAL MANAGEMENT OF RABIES