

Rabies Virus and Other Lyssavirus (including Australian Bat Lyssavirus): Exposures and Infections

NSW Control Guideline for Public Health Units

Revision history

Version	Date	Revised by	Changes	Approval
1.0	01/07/2013	-	-	-
2.1	30/11/2015	Communicable Disease Branch	Update to: <ul style="list-style-type: none"> • Ensure consistency with the CDNA Rabies and Other Lyssavirus Series of National Guidelines, v3.0 and The Australian Immunisation Handbook, 10th edition • Provide NSW-specific operational advice, including: factors to consider in risk assessments, afterhours PEP orders, communication, data management and bat testing. 	Approved 21/12/2015

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1. Summary

Public health priority

Urgent.

Case management

No known effective treatment. Isolate case with standard and contact precautions for the duration of illness. Determine the source of infection.

Contact management

Urgently assess the need for post-exposure prophylaxis in people exposed to mammalian animals or confirmed human cases. Use of human rabies immunoglobulin (HRIG) and rabies vaccine is dependent on the type of exposure and prior vaccination.

2. The disease

Infectious agents

Rabies virus, Australian bat lyssavirus (ABLV), and other lyssaviruses such as European bat lyssavirus (EBLV) 1 and EBLV 2, are members of the *Rhabdoviridae* family, genus *Lyssavirus*. Fourteen closely related but distinct lyssavirus species have been formally recognised.¹ Rabies virus and other lyssaviruses cause the disease rabies.

Reservoir

All mammals are susceptible to infection with rabies virus and are therefore possible reservoirs. Dogs are the principal reservoir of rabies virus in developing countries and are responsible for 99% of human infections.² Other reservoirs and important vectors of rabies virus include wild and domestic *Canidae*, including dogs, foxes, coyotes, wolves and jackals; and bats, cats, monkeys, skunks, raccoons, and mongooses. Other mammals may rarely be infected. Australia is currently free of rabies in terrestrial (land dwelling) mammals. However, evidence of ABLV infection has been documented in several species of flying foxes (also known as fruit bats) and insectivorous microbats. It is assumed that all Australian bat species have the potential to carry and transmit ABLV. ABLV has not been isolated from bats outside Australia. However, several lyssavirus species have been found in bats in other countries considered free of terrestrial rabies. It is assumed that bats anywhere in the world have the potential to carry and transmit lyssaviruses.

Mode of transmission

Rabies virus is transmitted by the virus-laden saliva of an infected animal introduced via a bite or scratch, or by contamination of mucous membranes or broken skin. Person-to-person transmission via saliva is extremely rare and has not been well documented. There have been rare reports of rabies virus transmission by transplantation of infected tissues/organs^{3, 4} and via inhalation of virus-laden aerosol in laboratory settings.^{5, 6} Aerosol transmission in humans has not been proven in the natural environment but based on animal experiments it remains theoretically possible.^{7, 8}

The only three known human cases of ABLV infection occurred in people who had been bitten or scratched by bats. It is assumed that the mode of transmission for ABLV and other lyssaviruses is similar to that of rabies virus. Bat or other animal blood, urine, and faeces are not considered to be infectious.⁹

Incubation period

The incubation period for rabies virus infection is usually 3-8 weeks, rarely as short as a few days or as long as several years.¹⁰ The length of the incubation period depends on many factors including wound severity, wound location in relation to nerve supply, proximity to the brain, size of inoculum of virus and the degree of protection provided by clothing and other host factors.¹⁰ The incubation period for ABLV and other lyssavirus infections is less certain but is assumed to be similar to rabies virus; the first two documented cases of ABLV infection had likely incubation periods of approximately 4 weeks and over 2 years, respectively.¹¹ The likely incubation for the third case has not been confirmed.

Infectious period

The infectious period for rabies virus infection has been described reliably only in dogs, cats and ferrets, in which communicability usually commences 3-7 days before onset of clinical signs and persists throughout the course of the illness.¹⁰ The period of communicability of ABLV and other lyssaviruses is not known.

Clinical presentation and outcome

As the clinical disease caused by classical rabies virus and other lyssaviruses appears to be indistinguishable, the term 'rabies' refers to disease caused by any of the known lyssaviruses. Rabies is an almost invariably fatal, acute viral encephalomyelitis. Initial symptoms include fever and sensory changes (pain or paraesthesia) at the site of a preceding animal bite. Other reported prodromal symptoms include a sense of apprehension, headache and malaise. There are 2 clinical forms of rabies. Encephalitic or furious rabies presents in about two-thirds of cases, and is characterised by hyperactivity and aerophobia and/or hydrophobia followed by delirium with occasional convulsions. The second form, paralytic or dumb rabies, presents in about one-third of cases, with paralysis of limbs and respiratory muscles with sparing of consciousness.¹² Phobic spasms may be absent in the paralytic form. Death from cardiac or respiratory failure occurs within a few days for furious rabies and within 1-2 weeks for the paralytic form of the disease.^{2, 10}

People at increased risk of disease

The risk of infection after the bite of a rabid animal can range from less than 1% to over 80%, presumably related to the size of inoculum, severity of bite, nerve density in the area of the bite, proximity of the bite to the central nervous system, vaccination status and immunocompetence.¹³ People at increased risk of rabies are those whose occupational, volunteering, or recreational activities put them at increased risk of exposure, i.e. being bitten or scratched by animals in rabies-zoonotic countries or by bats anywhere in the world. In Australia, therefore, risk is greatest in those who holiday or work in countries in which rabies is enzootic, and in those most likely to come into contact with bat species, including wildlife carers, wildlife officers, veterinarians and those who live in areas where bats are common and have direct contact with bats.

Disease occurrence and public health significance

Australia is free from terrestrial rabies. Only two imported human cases have been reported in Australia, in people from enzootic areas.^{14, 15} Rabies virus is enzootic in Asia (including Southeast Asia where large numbers of Australians travel), Africa, North and South America and parts of Europe. Worldwide, it is estimated that rabies virus is responsible for more than 55,000 deaths per year, almost all in rural areas of Asia and Africa, with the highest incidence in children under 15 years.¹⁶ Rabies is estimated to have at least as much public health impact in tropical countries as dengue fever (when comparing disability-adjusted life years) and results in an estimated annual global financial burden of over US\$ 1 billion.^{16, 17} Most human deaths follow dog bites for which adequate post-exposure prophylaxis was not or could not be provided. Post-exposure prophylaxis initiated at an early stage using rabies vaccine in combination with rabies immunoglobulin is effective in preventing death. In Australia, rabies is subject to quarantine controls under Commonwealth biosecurity legislation - currently the Quarantine Act 1908. The primary concern is the prevention of the introduction of rabies virus to local dog and wildlife populations.

ABLV is unique to Australia and was first identified in 1996 in an encephalitic black flying fox. Three human cases have subsequently been reported, in 1996, 1998 and 2013 with all three cases developing fatal encephalitis after being bitten or scratched by bats.^{11, 18-20} To date, virological and/or serological evidence of ABLV infection has been found in all four species of flying foxes (megachiropterans) found in Australia, and at least seven genera of Australian insectivorous bats.²¹ Any Australian bat should be considered a potential carrier of the virus. The risk of human exposure to ABLV is related to the extent of human contact with Australian bats.

In 2013 two horses from the same Queensland property were confirmed to be infected with ABLV. Both horses displayed neurological signs and were euthanased.²² The risk of secondary transmission

to humans is thought to be very low; however, a risk assessment should be conducted following any potential exposure (see [Domestic animals exposed to a bat in Australia](#)).

Four human deaths have been documented following bat exposures in Europe (in Ukraine, the Russian Federation, Finland and Scotland). All presented with clinical features of rabies. The causative viruses were identified as EBLV 1a, EBLV 2a, EBLV 2b, and one untyped lyssavirus.^{23, 24} Spillover infections with EBLV have been reported in 5 sheep, 2 cats and a stone marten in Europe.²⁵⁻²⁷

3. Routine prevention activities

Pre-exposure vaccination

Pre-exposure vaccination with rabies vaccine is recommended for people whose occupation (including volunteer work) or recreational activities place them at increased risk of being bitten or scratched by bats, and, following a risk assessment, those who work in or travel to rabies-enzootic countries. (WHO maintain [maps of rabies-enzootic areas](#); The UK Health Protection Agency (HPA) maintains a [list of terrestrial rabies risk by country](#)).

Current recommendations for pre-exposure vaccination include:

- Bat handlers, veterinarians, wildlife officers, and others who come into direct contact with bats; laboratory personnel working with live lyssaviruses
- Expatriates and travellers (following a risk assessment) who will be spending time in rabies-enzootic areas
- People working with mammals in rabies-enzootic areas.⁹

Pre-exposure vaccination with rabies vaccine consists of 3 doses by intramuscular (IM)* injection; with the second dose 7 days after the first and the third dose 21-28 days after the first dose. Although the third dose can be given as early as Day 21, there are no data to support the use of an even more accelerated schedule for those with limited time before travel to a rabies-enzootic country.⁹

Booster doses are not required for anyone who has received 3 or more previous IM doses of rabies vaccine, if their only exposure risk is travelling to or living in a rabies enzootic area.¹⁶ Booster doses may be required if there is an ongoing occupational (including volunteer work) exposure risk, on the basis that there may be increased likelihood of an inapparent exposure occurring. An algorithm outlining the approach to booster doses is provided at [Appendix 1](#). Consult the current edition of [The Australian Immunisation Handbook](#) if further information on vaccine administration and booster doses are required.⁹

**As described in [The Australian Immunisation Handbook](#), there are two rabies vaccine preparations available in Australia, one a human diploid cell vaccine (HDCV) and the other a purified chick embryo cell vaccine (PCECV). PCECV must be given by the IM route, but HDCV may be given by either the IM or subcutaneous (SC) route. For simplicity, all descriptions of administration of rabies vaccine in these Guidelines refer to the IM route.*

Intradermal vaccination

It is strongly recommended that the IM route be used for pre-exposure vaccination in Australia. Antibody titres at 14 days are lower and wane more rapidly after intradermal (ID) administration of rabies vaccine, and there may be a slower initial immune response following exposure to rabies virus.^{28, 29} As rabies vaccines are not licensed for ID use in Australia, any use of this method is the practitioner's own responsibility. If ID rabies pre-exposure vaccination is considered (using a dose of 0.1 mL on Days 0, 7 and 28) it is essential that:

- it is given by those with expertise and regular practice of the ID technique
- it is not administered to anyone who is immunocompromised
- it is not administered to those taking either chloroquine or other antimalarials structurally related to chloroquine (e.g. mefloquine) at either the time of, or within a month following, vaccination
- any remaining vaccine is discarded at the end of the session during which the vial is opened (i.e. within 8 hours)
- the rabies virus neutralising antibody (VNAb) level is checked 14 to 21 days following completion of the pre-exposure course of ID vaccine.
- It is only used for pre-exposure vaccination for classical rabies exposures (there are no data on the protection provided by ID rabies vaccination for the prevention of infection with other lyssaviruses including ABLV).⁹

Handling bats

Only appropriately vaccinated and trained people should handle bats. Members of the public are strongly advised not to attempt to handle bats (live or dead), but rather contact the NSW Wildlife Information, Rescue and Education Service (WIRES, 1300 094 737) who can rescue and transport bats to a private veterinarian who normally deals with wildlife. If bats must be handled, every effort should be made to avoid being bitten or scratched, including:

- Using appropriate personal protective equipment (PPE), such as puncture-resistant gloves (e.g. Nitrile (double or thicker), Kevlar or suede/leather welding-type gloves) and gauntlets, long sleeved clothing, safety eyewear or face shield to prevent mucous exposures, and a towel to hold the bat
- using a garden fork, spade or other implements to handle dead bats.³⁰

Travel advice

Travellers should be advised to avoid close contact with bats anywhere in the world. Travellers to rabies-enzootic regions should also be advised to avoid close contact with wild or domestic terrestrial mammals (especially dogs, cats and monkeys). Travellers should also be advised what to do should they be bitten or scratched by an animal while abroad. This advice should include stressing the importance of obtaining as much written detail as possible on any post-exposure management provided overseas. Parents should ensure that their children are careful around animals as children are at optimal height for high-risk bites to the face and head. Rabies pre-exposure vaccination (or if appropriate, booster doses) should be advised pre-travel where indicated by a risk assessment, which should include ease of access to post-exposure prophylaxis (PEP) and likelihood of interaction with animals based on type of accommodation and planned activities. See the *Information Sheet for Travellers* ([Appendix 6](#)) for detailed advice for travellers.

Management of potential human exposure to rabies or other lyssaviruses, including ABLV (see algorithms in [Appendices 2-3](#))

Definition of potential exposure

Any bite or scratch from, or mucous membrane or broken skin contact with the saliva or neural tissues of:

- a bat in Australia or elsewhere in the world
- a wild or domestic terrestrial mammal in a rabies-enzootic country – this includes Bali, Indonesia from August 2008 onwards
- a wild or domestic terrestrial mammal in Australia, where there is laboratory confirmation of infection with any lyssavirus – see also [Domestic animal exposed to a bat in Australia](#).

If there are concerns about other potential exposures, expert advice should be sought.

Principles of post-exposure management

Post-exposure management is recommended for any person with a potential exposure. Post-exposure management comprises wound care and administration of a combination of rabies vaccine and human rabies immunoglobulin (HRIG) at varying urgency, depending on:

- **Type of exposure** (see Table 1)
- **Severity** (e.g. size and number of wounds) and **location** of wounds in relation to nerve centres – head, face or neck wounds are generally considered a higher risk and should be attended with greater urgency
- **Age of the individual** and **reliability of information** about the event – exposure of young children, mentally disabled persons or other circumstances where a reliable history cannot be obtained may necessitate treatment as a category II or III exposure
- **Prior rabies vaccination and/or antibody status** of the individual
- **Details about the animal exposed to**, including: the species, risk of rabies in that species and geographic location, the circumstances of exposure (provoked, unprovoked) and behaviour of the animal. The PEP management pathway will depend on the animal involved in the exposure:
 - [Appendix 2](#) should be used for exposures to rabies virus from a terrestrial animal overseas
 - [Appendix 3](#) should be used for exposures to lyssaviruses from bats in Australia or overseas
- **Time interval since exposure** – PEP should be considered regardless of the time interval but may be delayed or discontinued in certain circumstances (see below)
- **Availability of the animal for observation or testing** (see below).

Table 1: Lyssavirus exposure categories*

Type of exposure	Description
Category I	Touching or feeding animals, licks on intact skin, as well as exposure to blood, urine or faeces or to an animal that has been dead for more than 4 hours
Category II	Nibbling of uncovered skin, minor scratches or abrasions without bleeding
Category III	Single or multiple transdermal bites or scratches, contamination of mucous membrane with saliva from licks, licks on broken skin

** To be used in conjunction with algorithms in [Appendices 2 and 3](#). PEP management pathways differ following potential bat exposures. Source: Modified from WHO 2010¹⁶*

Post-exposure management should generally commence as soon as possible following potential exposure and in all circumstances [wound care](#) should occur immediately. The administration and logistics of providing rabies PEP is, however, resource intensive to the health system and demanding on individuals. In certain low-risk circumstances, ordering and commencing PEP may be delayed, or PEP may be discontinued:

- If a traveller presents more than 10 days after being bitten or scratched by a domestic dog, cat or ferret in a rabies-enzootic country, and it can be reliably ascertained that the animal remains healthy, then post-exposure management is not required. Note that this recommendation does not apply to exposures to other animals, including bats, which may be documented to be alive beyond 10 days after the exposure.

- Bats involved in a potential ABLV exposure in Australia should be tested where possible, without placing others at risk of exposure. In such situations PEP can be delayed for 48 hours post-exposure to enable a result from the bat to be received. If results are not likely to be available within 48 hours of exposure then PEP should be commenced. If the bat tests negative, PEP is not required, and may be discontinued if already commenced.
- Afterhours orders of PEP from the Vaccine Centre (open Monday to Friday, 8.30am to 4.30pm) can generally be delayed to the next business day, unless the exposure is deemed of a particular high-risk nature after considering all factors in the risk assessment. All afterhours orders should be approved by the Director of the Public Health Unit (PHU). A [guideline and algorithm](#) to assist PHU staff in conducting risk assessments and making decisions with regards to the timelines and circumstances around delaying or discontinuing PEP is available on PopNet.

If unsure about delaying or discontinuing PEP, discuss with cdoncall before ordering.

Wound care

Regardless of previous rabies vaccination, immediate cleansing of the wound is an important measure for minimising transmission risk.³¹ Animal studies have shown that immediate and thorough cleansing of the wound reduces the risk of infection.^{32, 33} All wounds should be washed thoroughly for at least 5 minutes with soap and copious water, as soon as possible after the exposure. A virucidal antiseptic solution such as povidone-iodine or alcohol should be applied.¹⁶ The wound should not be sutured unless unavoidable, and then only after HRIG administration, where indicated. Consideration should also be given to the possibility of tetanus and other wound infections, and appropriate measures taken. In the event of mucous membrane (eyes, nose, mouth) exposure immediately flush with copious water.

Post-exposure prophylaxis for people not previously vaccinated

Immunocompetent people should receive 4 doses of rabies vaccine by IM injection on days 0, 3, 7 and 14. Where applicable, a single dose of HRIG should also be given as outlined in [Appendices 2-3](#).

Immunosuppression

Immunocompromised people (whether through disease or treatment) should receive five doses of vaccine IM on Days 0, 3, 7, 14 and 28, for both rabies and other lyssavirus (including ABLV) potential exposures. Where applicable, a single dose of HRIG should also be given, as outlined in [Appendices 2-3](#). A person who is immune-suppressed should have rabies virus neutralising antibody (VNAb) titre checked 2 to 3 weeks after completion of the vaccine regimen. If the titre is <0.5 IU/ml a further dose of vaccine should be given and serology re-checked 2 to 3 weeks later. Where the titre remains suboptimal (<0.5 IU/mL) an infectious diseases expert should be consulted about the need for further doses.

Post-exposure prophylaxis for people previously vaccinated

People who have documented evidence of a completed IM course of pre-exposure prophylaxis or PEP using an appropriate cell culture based rabies vaccine at any time in the past, or who have documented rabies VNAb titres ≥ 0.5 IU/ml¹⁶ (e.g. at any time subsequent to a course of ID pre-exposure vaccination), should receive 2 doses of vaccine IM on Days 0 and 3. HRIG is not required. If vaccination status is uncertain, management should occur as for people not previously vaccinated.

Immunosuppression

Previously vaccinated people who are immunocompromised (whether through disease or treatment) should have rabies virus neutralising antibody (VNAb) titre checked 2 to 3 weeks after the second dose of vaccine. If the titre is <0.5 IU/ml an infectious diseases expert should be consulted about the total number of doses required for PEP.

Rabies vaccine use

For adults and children one year of age or older, the rabies vaccine should be administered into the deltoid area, as administration in other sites may result in reduced neutralising antibody titres. In infants under 12 months of age, administration into the anterolateral aspect of the thigh is recommended. Corticosteroids and immunosuppressive therapy can interfere with the development of active immunity and, therefore, if possible, should not be administered during the period of PEP.³⁴

HRIG use

HRIG, where indicated, should be infiltrated at a dose of 20 IU/kg in and around all wounds. The HRIG product routinely used in NSW is typically supplied in 2mL vials containing 150 IU/mL. The following formulae can be used to calculate the volume and number of vials of HRIG required:

$$\begin{aligned} \text{Total units required (x)} &= \text{Patient weight in kg} \times 20 \text{ IU} \\ \text{Volume of HRIG needed to administer in mL (y)} &= (x) \div 150 \text{ IU} \\ \text{Total number of vials needed to order (round up where required)} &= (y) \div 2 \end{aligned}$$

It is imperative that as much HRIG as possible is given in and around the wound/s. It may be diluted if there are multiple wounds but as much as possible should go into and around the wounds. The balance of any HRIG dose that cannot safely be infiltrated in and around the wound, or the whole HRIG dose in situations such as mucous membrane exposures (where there is no wound), should be given IM (not into fat) at a site distant (e.g. alternative deltoid, lateral thigh, or gluteal muscle, depending on volume) to that where rabies vaccine is given.

HRIG is given to provide localised anti-rabies antibody protection while the person mounts an immune response to the rabies vaccine. HRIG should be administered with the first dose of rabies vaccine (Day 0). If this is not possible, HRIG can be given up to Day 7 following the first dose of vaccine, but it is not recommended from Day 8 onwards as it may suppress the immune response to the vaccine.

Period of HRIG shortage

Recurrent shortages of HRIG have occurred in Australia. From time to time, HRIG prioritisation measures may be implemented, at the recommendation of the Communicable Diseases Network Australia. Similarly, special arrangements may be made for use of unregistered HRIG or equine RIG products. In such circumstances, CDNA and the Communicable Diseases Branch, Health Protection NSW will provide advice on variations to recommendations provided in these guidelines. PHU staff should consult PopNet for the [current status and endorsed protocol](#) for rationing HRIG stocks.

Management of PEP in people who have begun prophylaxis overseas

The principle of management of PEP in people who have begun prophylaxis overseas is to continue the course of treatment with an appropriate cell culture derived vaccine. International advisory groups state that cell culture based vaccines can be used interchangeably to complete a treatment course.⁹ HRIG should be given if indicated, as outlined in [Appendices 2-3](#), if RIG (whether equine or human) was not given and the person presents up to Day 7 following the first vaccine dose. If the person presents from Day 8 onwards then HRIG should not be administered.

A number of WHO endorsed rabies PEP schedules are used overseas. These include:

- Zagreb schedule (2 doses on Day 0, single doses on Days 7 and 21)
- Essen schedule (doses given on Days 0, 3, 7, 14 and either 28 or 30)
- Modified Essen schedule (doses given on Days 0, 3, 7 and 14).

Table 2 provides recommended courses of action for continuation of PEP in Australia after it has been commenced overseas, for the scenarios most commonly encountered. Other situations should be dealt with on a case by case basis, informed by the following considerations:

- HRIG should not be administered on Day 8 or later following the first documented dose of rabies vaccine, even if recommencing an interrupted vaccine course, on the basis that HRIG may suppress the immune response to rabies vaccine
- Where there is good documentation that one or more doses of an appropriate cell culture based vaccine + RIG (equine or human) have been given, the schedule can generally be continued, with appropriate realignment.

In situations which are not straightforward, seek expert advice on an appropriate schedule, including consideration as to whether testing of rabies VNAb titres is indicated.

Table 2: Post-exposure prophylaxis commenced overseas and recommended completion in Australia

Treatment (vaccine +/- RIG) administered overseas	Rabies vaccine schedule in Australia	Use of HRIG in Australia (Category III terrestrial animal exposures and Category II and III bat exposures only*)
Unsure/unknown/poor documentation	Recommence course, starting from Day 0.	Administer HRIG if up to Day 7 following the first dose of rabies vaccine. Do not administer if Day 8 or later.
Well documented, RIG (equine or human) given, plus vaccine given either IM or ID	Align with nearest due dose and resume schedule, adjusting for delay and administering vaccine IM (e.g. if a person had only Day 0 vaccine dose + RIG overseas, and presents 6 days later, give Day 3 dose immediately, Day 7 dose 4 days later and Day 14 dose 7 days after that).	No HRIG needed
2 doses of rabies vaccine given IM on Day 0, <i>irrespective of whether</i> RIG (equine or human) administered at same time as the 1st doses.	Give further 2 doses, the first dose on Day 7 and the 2nd dose on Day 14. If patient presents after Day 7, give dose 3 as soon as practicable (next business day) and dose 4 seven days later.	Administer HRIG if no RIG already given and if up to Day 7 following the first doses of rabies vaccine. Do not administer if Day 8 or later.
Immune impaired, with vaccines administered ID.	Irrespective of number of doses administer a 5-dose schedule IM and check antibody titre (see 'Immunosuppression' p 7).	Administer HRIG if no RIG already given and if up to Day 7 following the first ID dose of rabies vaccine administered overseas. Do not administer if Day 8 or later.
Nerve tissue vaccine (NTV)	Recommence course, starting from Day 0.	Administer HRIG if no RIG already given, and if up to Day 7 following first dose of NTV given overseas.

*IM = intramuscular; ID = intradermal . * See Table 'Lyssavirus exposure categories' above and Appendices 2-3.*

4. Surveillance objectives

- To rapidly identify people potentially exposed to rabies virus or other lyssaviruses (including ABLV) and to provide appropriate advice and prophylaxis
- To monitor the epidemiology of rabies virus and other lyssavirus (including ABLV) infection and potential exposures to better inform prevention strategies, including travel advice.

5. Data management

The following should be entered on NCIMS within one working day of notification:

- Confirmed or suspected cases of rabies virus or other lyssavirus (including ABLV) infection
- All potential human exposures notified to PHUs, regardless of whether or not PEP is required, or if PEP has already been completed (e.g. where the full course has been completed overseas or through private purchase).

The event type and condition should be assigned in NCIMS as follows:

Table 3: Classification of potential exposures and cases on the NSW Notifiable Conditions Information Management System (NCIMS)

Situation	Event type	Condition
Exposed to mammal overseas	Contact/exposed person	Lyssavirus - Unspecified
Exposed to bat in Australia	Contact/exposed person	Lyssavirus - Unspecified
Confirmed human case of lyssavirus/ABLV in Australia	Case	Lyssavirus - ABL
Confirmed human case of classical rabies	Case	Lyssavirus - Rabies

When entering potential exposures on NCIMS, it is most important to capture:

- Details about the place of exposure/acquisition under both the 'Clinical' and 'Risk History' packages
- Details about the animal exposed to, and for bat exposures in Australia, if testing was completed and the test results
- The person's occupation (under the Demographic package) and if in a high-risk occupation (under the Risk History package, especially for bat exposures in Australia)
- If PEP was recommended and details on the course of PEP completed.

These data are used to monitor and manage rabies vaccine and HRIG resources, and inform future actions to mitigate unnecessary use of PEP where possible.

6. Communications

Doctors should contact their local PHU on 1300 066 055 for advice on potential exposures to rabies or ABLV. PHU staff will help arrange rabies vaccine and HRIG where required. Where indicated, authorised PHU staff can order PEP via the [NSW Vaccine Centre Online Ordering System](#). Before placing orders, it is critical for PHU staff to review the patient's weight and calculate the amount of HRIG required to avoid unnecessary repeat orders.

Any case where rabies or ABLV infection is being considered as part of a differential diagnosis should be immediately reported to the local PHU by telephone. PHU staff will investigate the possible source/s of infection, facilitate laboratory testing, and determine whether others may be at risk of infection who may require PEP.

If local transmission of rabies or other lyssavirus to a terrestrial animal is suspected, the NSW Department of Primary Industries should be contacted urgently by phoning the Emergency Animal Disease Watch Hotline on 1800 675 888.

Members of the public are strongly advised to not attempt to handle bats. PHUs or the public should rather contact WIRES (1300 094 737) who will collect and transport the bat to a veterinarian who normally deals with wildlife.

7. Case definition

Only confirmed cases of rabies virus or other lyssavirus (including ABLV) infection are notifiable. See the Department of Health [website](#) for the current national surveillance case definition. See [Contact management](#) for the definition of a potential rabies/ABLV exposure.

8. Laboratory testing

Testing guidelines – humans

Testing for rabies virus or other lyssaviruses is indicated for persons where rabies is being considered in the differential diagnosis of a clinically compatible illness. Routine serological tests and antigen detection tests cannot distinguish between the different lyssaviruses, but they can be identified by PCR and culture. No laboratory tests are currently available to diagnose rabies in humans before the onset of clinical disease. In the early stages of disease, saliva and CSF can be tested by virus culture and PCR. Antibody testing can also be performed on CSF. A positive serum antibody test is diagnostic of infection with a lyssavirus provided the person has never been immunised against rabies and may assist in the diagnosis of rabies in advanced clinical disease. Any negative test on a symptomatic person is not definitive, as viral shedding in body secretions is intermittent and early tests may be negative for antibody. Therefore repeat testing is often indicated. Post mortem, the standard diagnostic techniques include positive fluorescent antibody test (FAT) and nucleic acid test (NAT) on fresh brain smears, and NAT and culture from tissues. Further information is available from the Public Health Laboratory Network (PHLN) case definition [website](#).

Refer to [The Australian Immunisation Handbook](#) for information on routine serological testing for immunity in people who may be occupationally exposed to rabies virus or other lyssaviruses (including ABLV) or who have impaired immunity.

Testing and specimen submission guidelines – animals

Testing of animals for rabies virus or other lyssaviruses (including ABLV) is indicated in any situation where a person has been exposed to a potentially infected animal. Where possible, PHU staff should arrange for safe handling, euthanasia where relevant, and ABLV testing of bats that have been involved in potential human exposures – refer to the [Guidelines for testing bats involved in human exposures](#) available on PopNet.

Only appropriately trained and vaccinated individuals should handle potentially infected animals. Members of the public are strongly advised to not attempt to handle bats. PHUs or the public should rather contact WIRES (1300 094 737) who will collect and transport the bat to a veterinarian who normally deals with wildlife. The veterinarian (or other appropriately trained official) will euthanase the bat, and prepare and package it for transport in accordance with DPI's [Australian Bat Lyssavirus Guidelines for Veterinarians](#) and [Vet Lab Manual](#). Before shipping specimens, submitters should contact the Emergency Animal Disease Hotline (1800 675 888) to confirm arrangements e.g. for sampling, transport and specimen reception.

A positive result from NAT, FAT or virus culture on fresh brain smear of the animal is diagnostic of rabies. PEP is not required and may be discontinued following a negative NAT or FAT result.

Occasionally, implicated animals may be tested in overseas countries where Australians have been exposed – PHUs should endeavour to liaise with the overseas laboratory or public health authorities in such circumstances to ascertain the result.

Reference laboratories

The diagnosis of rabies due to rabies virus or ABLV can be confirmed in humans by Queensland Health Forensic and Scientific Services (QHFSS), and in animals in NSW by the Elizabeth Macarthur Agricultural Institute (EMAI) or Australian Animal Health Laboratory (AAHL). PHUs should refer to the [*Guidelines for testing bats involved in human exposures*](#) available on PopNet.

- **Queensland Health Forensic and Scientific Services (QHFSS)**
39 Kessels Road
Coopers Plains
QLD 4108
Ph 07 32749111
Fax 07 32749119
- **State Veterinary Diagnostic Laboratory (SVDL)
Elizabeth Macarthur Agricultural Institute (EMAI)**
Woodbridge Road
Menangle
NSW 2568
Ph 1800 675 623 (office hours only)
- **Australian Animal Health Laboratory (AAHL)**
5 Portarlington Rd
East Geelong
VIC 3219
Ph 03 5227 5000
Fax 03 5227 5555

9. Case management

Response times

On the same day of notification of a confirmed case of human disease begin follow up investigation and notify the Communicable Diseases Branch, Health Protection NSW.

Response procedure

Case investigation

PHU staff conducting the investigation should ensure that action has been taken to:

- confirm the onset date and symptoms of rabies
- confirm results of laboratory tests
- seek the doctor's permission to contact the case (where possible) or relevant care-giver
- interview case (if possible) or carer and determine source of infection - see [Exposure Investigation](#).

Exposure Investigation

Determine the history of contact with bats (in Australia or overseas) or any other mammal in a rabies-enzootic country. Determine the type of animal (and for bats the species if possible), the circumstances and type of exposure, and whether other people or animals may also have been exposed.

Case treatment

There is no known effective treatment for rabies. A small number of patients have survived rabies following intensive experimental and/or supportive treatment.³⁵⁻³⁷

Education

The rabies fact sheet should be available to carers, and provides information about the nature of infection and mode of transmission. See [Appendix 5](#).

Isolation and restriction

Isolate patient with standard and contact precautions for the duration of the illness.

Active case finding

Active case finding should occur to determine if any other people or animals were exposed to the source animal of the case. Exposed people should be urgently assessed for post-exposure prophylaxis; exposed animals should be managed by veterinary authorities.

10. Control of environment

Any suspected infected animals should be isolated from other animals and humans, and veterinary investigation/management sought. Bats involved in a potential ABLV exposure in Australia should be tested where possible, without placing others at risk of exposure.

For overseas exposures to domestic dogs, cats or ferrets (but not other animals) where observation of the suspected animal is possible, information on whether the dog, cat or ferret remained healthy at least 10 days after the exposure incident may be useful for assessing risk of infection and the need for completion of PEP.³⁸

Environmental contamination by infected animals is considered negligible; this is based on knowledge of persistence of the classical rabies virus, which is fragile and does not survive for long outside the

host.³⁹ It is readily inactivated by heat and direct sunlight. Bats or other animals that have been dead for longer than 4 hours are no longer considered infectious for lyssaviruses.⁹ Bat or other animal blood, urine, and faeces are not considered to be infectious.⁹

Effective long-term control of lyssaviruses requires vaccination of host-species populations. Control of ABLV through vaccination of bats is not possible, and culling flying foxes would not control or eradicate ABLV. The risk of ABLV transmission within captive bat populations may be substantially reduced through quarantining new bat intakes to facilities for a short period of time. Specific guidance for bat carers is provided on the [Queensland Government Department of Agriculture and Fisheries website](#).²²

11. Contact management

Identification of contacts

Contact tracing is required to provide advice and post-exposure prophylaxis so as to prevent disease in contacts.

Contact definition

Contacts are defined as:

1. Persons who have been exposed to the saliva or neural tissue of an infectious person through mucous membrane or broken skin contact, or
2. Persons who have had mucous membrane or broken skin contact with infected or potentially infected animals. This includes any bat in Australia or overseas, any wild or domestic mammal in a rabies-enzootic country.

Prophylaxis

- Post-exposure prophylaxis is recommended for persons who fit the contact definition above. See [Management of potential human exposure to rabies or other lyssaviruses, including ABLV](#), and follow up using *Rabies virus and other lyssavirus post-exposure prophylaxis form* ([Appendix 4](#)).

Education

The rabies fact sheet should be available to inform exposed contacts about the nature of infection and mode of transmission. See [Appendix 5](#).

Isolation and restriction

None required.

12. Special situations

Domestic animal exposed to a bat in Australia

Other than bats, two horses and three humans, no other mammals have been documented to naturally contract ABLV infection. There is no evidence that ABLV has ever been passed from a wild (non-bat) or domestic animal to a human, and no definitive evidence that any lyssavirus has ever been passed from a domestic livestock animal to a human. There is, however, a possibility that ABLV spillover to domestic animals could occur occasionally, and a theoretical (although remote) possibility that an infected domestic animal could transmit infection to a human.

Follow-up by PHUs of incidents involving domestic animals which have suffered bites or scratches from bats is not required routinely. PHUs should, however, provide advice in accordance with this

guideline if contacted by concerned owners. If the owners are concerned about the health of the domestic animal they should be referred to the NSW Department of Primary Industries. The [AUSVETPLAN 2009 disease strategy for ABLV](#) recommends testing of the bat involved in an exposure to a domestic animal. Unless the bat is proven to be negative, veterinarians are advised to take one of three options in regards to the animal: vaccinate and minimise contact with other animals or humans until the vaccination protocol is complete; observe under formal or informal quarantine; or euthanase.

If a domestic animal which has been bitten or scratched by a bat subsequently bites or scratches a human, an expert panel may be convened to advise on management, at the discretion of the managing public health officer. If post-exposure prophylaxis is to be offered to human contacts in any situation involving domestic animals which have suffered bites or scratches from bats, in the absence of a defined human exposure (i.e. bite, scratch or mucous membrane exposure) to the bat, or laboratory confirmed lyssavirus infection in the animal, an expert panel should always be convened. Consultation with animal health colleagues may be indicated.

Active contact tracing following reports of confirmed ABLV in a bat

All reports of confirmed ABLV in bats received by a PHU, outside of an ongoing case investigation or risk assessment, should be actively followed up to assess the occurrence of any potential human exposures. This may include contacting the veterinarian who ordered the test, the person who submitted the bat, and any individuals who may have handled or come into contact with the bat. PEP should be recommended where appropriate.

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14. Appendices

Appendix 1 - [Vaccine booster dose algorithm for protection against rabies or other lyssaviruses](#)

Appendix 2 - [Post-exposure management algorithm for potential exposure to rabies virus from a terrestrial animal overseas](#)

Appendix 3 - [Post-exposure management algorithm for potential exposure to lyssaviruses from bats in Australia or overseas](#)

Appendix 4 - [Rabies virus and other lyssaviruses \(including ABLV\) post-exposure prophylaxis form](#)

Appendix 5 - [Rabies virus and other lyssaviruses \(including Australian bat lyssavirus\) fact sheet](#)

Appendix 6 - [Rabies Information Sheet for Travellers](#)

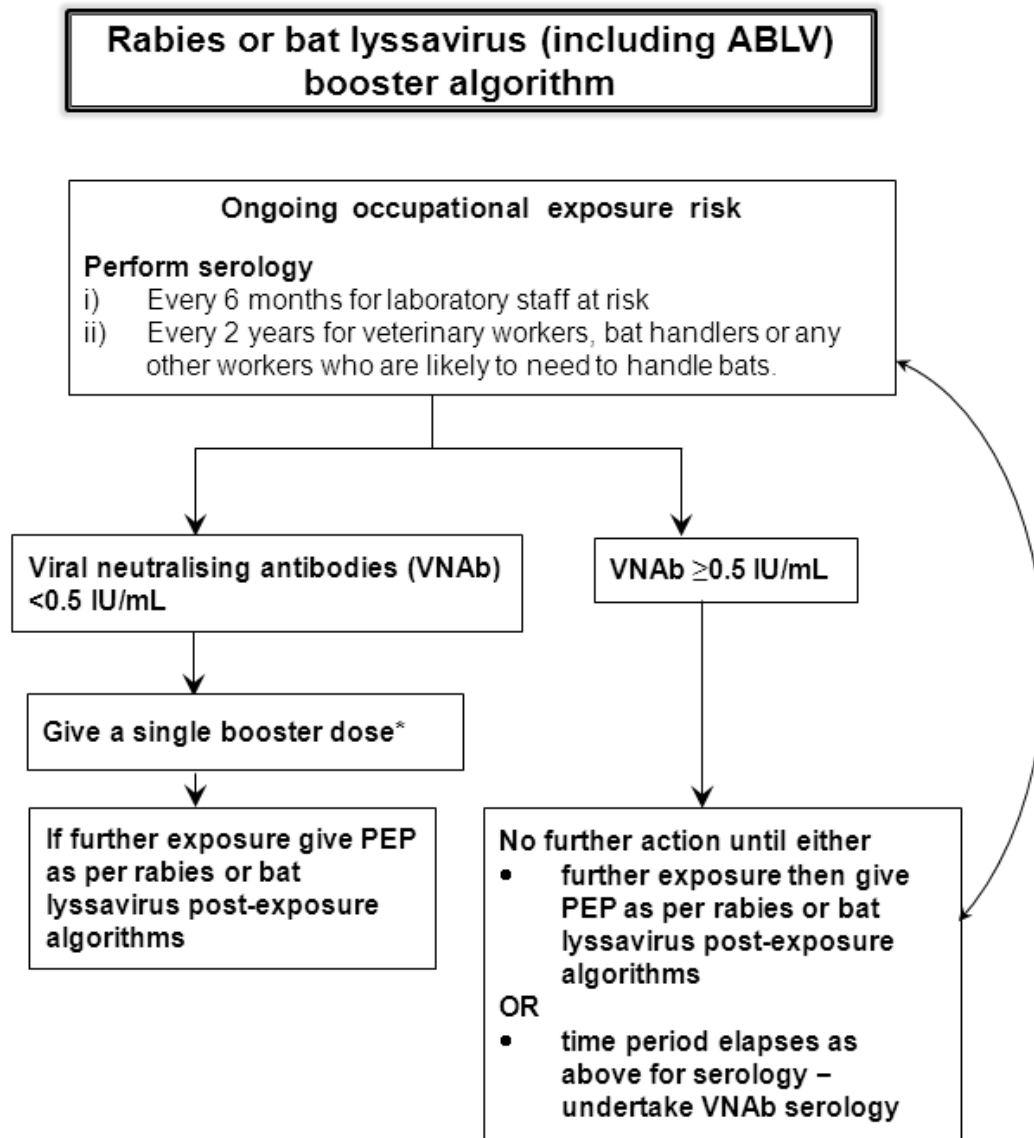
Appendix 7 - [PHU rabies virus and other lyssaviruses \(including ABLV\) follow-up checklist](#)

Additional resources for NSW Public Health Units:

To assist NSW Public Health Units in post-exposure management, the following additional documents are available via [PopNet ID Complementary Operating Procedures – Rabies and Bat Lyssavirus Infection](#) webpage:

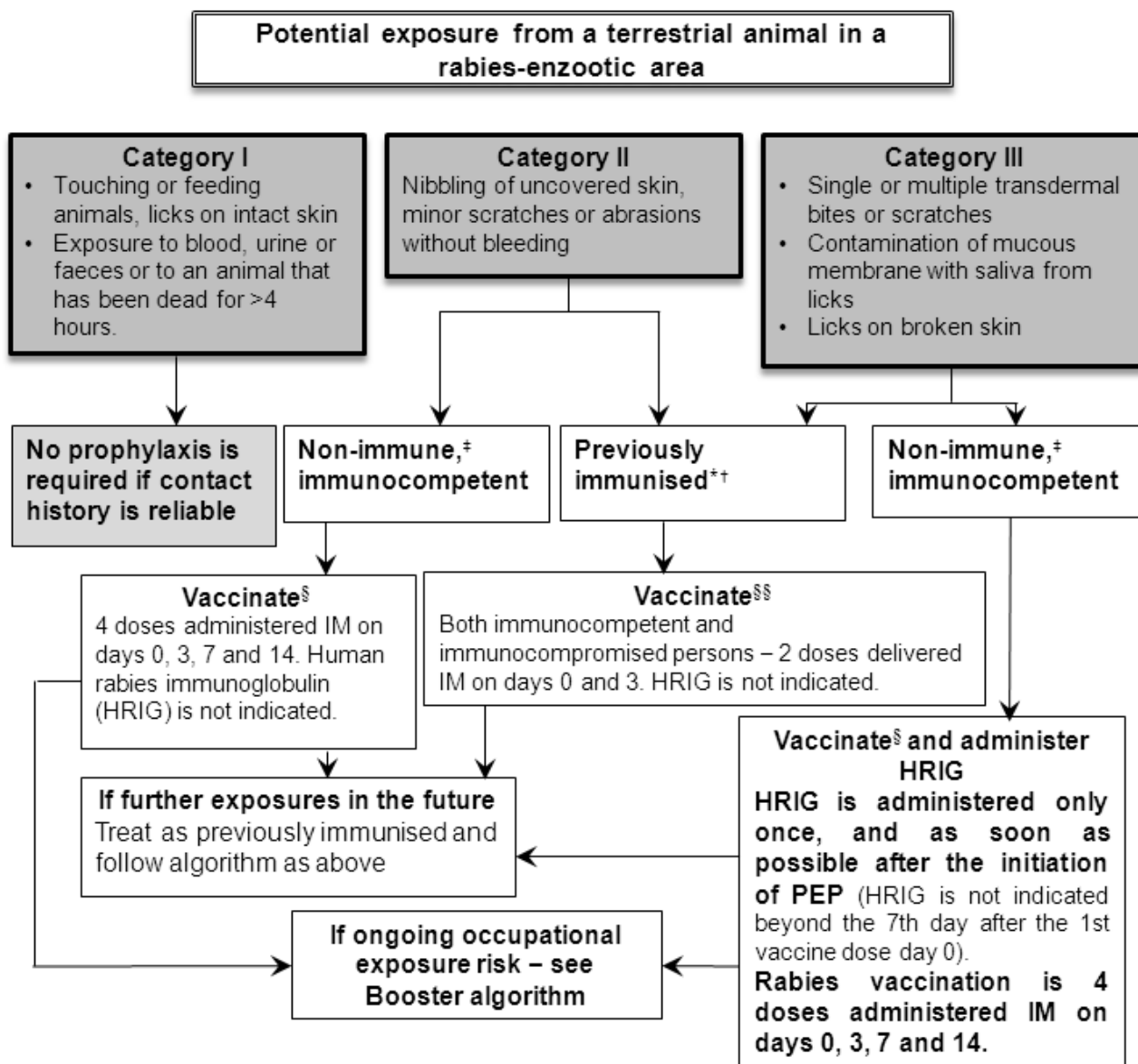
- Guidelines for testing bats involved in human exposures
- Principles of Post-exposure Risk Assessment and Timelines
- RIG Rationing Protocol (for use only when rationing is in effect).

Appendix 1. Vaccine booster dose algorithm for persons at ongoing risk of exposure to rabies virus or other lyssaviruses



***NB.** Immunocompromised patients' serology should be checked 14 to 21 days post booster dose and a further dose offered if the result remains <0.5 IU/mL.

Appendix 2. Post-exposure management algorithm for potential exposure to rabies virus from a terrestrial (land-living) animal overseas, or to terrestrial mammals in Australia that are confirmed to have lyssavirus infection



§ Immunocompromised persons, not previously vaccinated, should receive 5 doses of vaccine on days 0, 3, 7, 14 and 28. Serology should be checked 14 to 21 days post dose 5 and a further dose offered if the result is <0.5 IU/mL. In immunocompromised persons, HRIG should be administered if a Category II or III exposure.

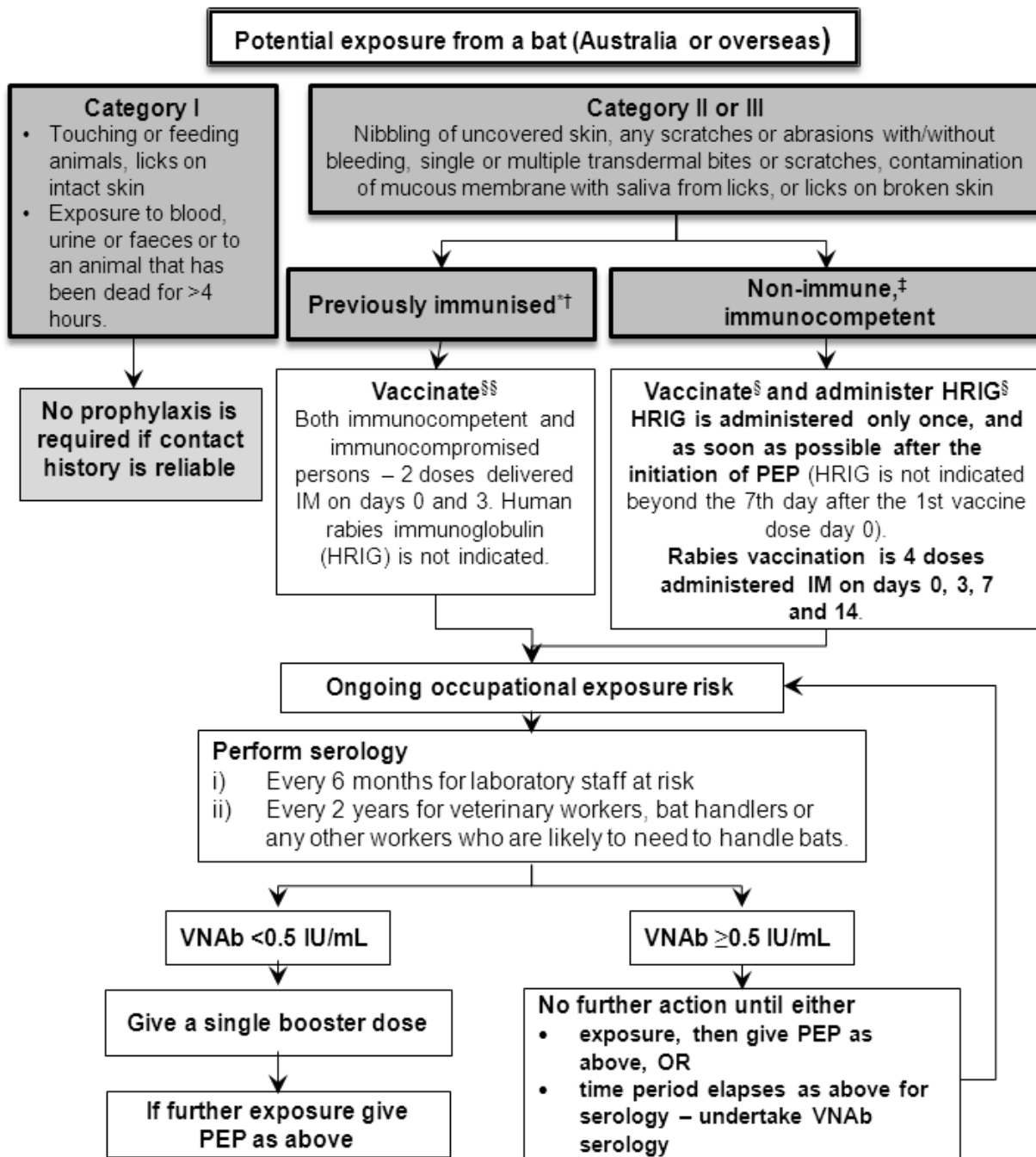
§§ Immunocompromised persons, previously immunised, should have serological testing 14 to 21 days after the 2nd dose to confirm acceptable VNAb levels. If the results is <0.5 IU/mL, expert advice should be sought regarding the total number of doses required for PEP.

* If in doubt, treat as non-immune.

† **Previously immunised** – documentation of a completed recommended PreP or PEP rabies vaccine regimen. This is irrespective of the time period since the last dose was administered. This may either be a completed primary pre-exposure course or post-exposure course and includes those where subsequent boosting has occurred, or documented rabies antibody (VNAb) titres of ≥ 0.5 IU/mL.

‡ **Non-immune** – person who has never received pre- or post-exposure immunisation with rabies vaccine, has had incomplete/inadequate primary vaccination course, or if any doubts about the vaccine(s) administered overseas

Appendix 3. Post-exposure management algorithm for potential exposure to lyssaviruses from bats in Australia or overseas



§ Immunocompromised persons, not previously vaccinated, should receive 5 doses of vaccine on days 0, 3, 7, 14 and 28. Serology should be checked 14 to 21 days post dose 5 and a further dose offered if the result is <0.5 IU/mL. In immunocompromised persons, HRIG should be administered if a Category II or III exposure. §§ Immunocompromised persons, previously immunised, should have serological testing 14 to 21 days after the 2nd dose to confirm acceptable VNAb levels. If the results is <0.5 IU/mL, expert advice should be sought regarding the total number of doses required for PEP.

* If in doubt, treat as non-immune.

† **Previously immunised** – documentation of a completed recommended PreP or PEP rabies vaccine regimen. This is irrespective of the time period since the last dose was administered. This may either be a completed primary pre-exposure course or post-exposure course and includes those where subsequent boosting has occurred or documented rabies antibody (VNAb) titres of ≥0.5 IU/mL.

‡ **Non-immune** – person who has never received pre- or post-exposure immunisation with rabies vaccine or has had incomplete/inadequate primary vaccination course

Appendix 4. Rabies virus and other lyssaviruses (including ABLV) post-exposure prophylaxis form

RABIES VIRUS and OTHER LYSSAVIRUSES (including ABLV) POST EXPOSURE ASSESSMENT	
Case details	ID no. _____
Name: _____ Sex M F	Date of birth ___/___/___
Address: _____	Phone: _____
Indigenous status: Aboriginal ___ Torres Strait Islander ___ Aboriginal and Torres Strait Islander ___ Non-indigenous ___ Unknown ___	
Person Notifying	
Name _____	Fax _____
Clinic/hospital name (if relevant) _____	
Address _____	Telephone _____
Suburb _____ State _____	Postcode _____
Exposure	
Date of exposure _____	Time of exposure _____
Type of wound	Bite Scratch Lick Saliva Other _____
Wound/exposure location	_____
Was the skin broken?	Y N U Depth/Severity _____
Did the wound bleed?	Y N U _____
Animal: Dog Cat Monkey Bat	Type..... Other Specify.....
Was the animal:	Wild Domestic Unknown
Did the animal appear unwell?	Y N U <i>If yes, describe:</i> _____
Was the animal provoked?	Y N U <i>Describe incident:</i> _____
Is the animal's owner/home known?	Y N U
When was the animal last seen alive? (date) ___/___/___	Animal's vaccination status, if known _____
If tested, was the animal positive for rabies virus or another lyssavirus?	Y N U
<i>If yes, provide details:</i> _____	
Where did exposure occur? (<i>geographic location-as precise as possible</i>) _____	
Country _____	

Case history

Did the case receive the wound during occupational (including volunteering) activity?

Y N U

Did the case spend more than a month in a rabies enzootic area? Y N U

Was the case working with mammals in a rabies enzootic area? Y N U

Did the case work with live lyssavirus in a laboratory? Y N U

Previous rabies vaccination? Y N U Doses _____ Date of last dose _____

Which vaccine? _____

Was immunoglobulin given? Y N U Date _____

Describe treatment of wound following incident: _____

Is the case immunocompromised? Y N U *If yes, details* _____

Treatment details (in Australia)

Date wound assessed ___/___/___

Who assessed the wound? GP ED PHU Health Service Other _____

RIG Date administered ___/___/___ Weight of case ___ kg amount used ___ mL

Vaccine Date of first dose ___/___/___ Doses required _____

Who will provide PEP (*if different to person notifying*) Name _____

Fax _____

Clinic/hospital name (if relevant) _____

Address _____ Telephone _____

Suburb _____ State _____ Postcode _____

Jurisdictional contact

Name _____ Fax _____

Address _____ Telephone _____

Suburb _____ State _____ Postcode _____

Appendix 5 - Rabies virus and other lyssaviruses (including Australian bat lyssavirus) fact sheet

Communicable Diseases Factsheet

Rabies and Australian Bat Lyssavirus Infection

Lyssaviruses are a group of viruses that includes rabies and bat lyssavirus. Lyssavirus is carried by bats in Australia. Rabies is carried by mammals in many overseas countries. Both are spread by bites and scratches. These diseases can be prevented by rapid and thorough cleaning of the wound and by vaccination. There is no cure.

Last updated: 30 November 2015

What are rabies and Australian bat lyssavirus?

Rabies virus and Australian bat lyssavirus (ABLV) belong to a group of viruses called lyssaviruses. These viruses are usually transmitted via a bite from an infected ("rabid") animal. They all cause a similar illness known as rabies, which affects the central nervous system and is usually fatal. The World Health Organization estimates that more than 55 000 people die from rabies worldwide each year. Rabies virus does not currently occur in land dwelling animals in Australia. However, ABLV, which is closely related but not identical to rabies virus, does occur in Australia, and can be transmitted from bats to humans. Only three cases of human infection with ABLV have been recorded since the virus was first identified in 1996. All three cases were in Queensland and all died as a result of ABLV infection after being bitten or scratched by bats.

What are the symptoms?

Rabies and ABLV infection are thought to cause similar symptoms. The early symptoms are flu-like, including headache, fever and fatigue. The illness progresses rapidly to paralysis, delirium, convulsions and death, usually within a week or two. Rabies cases and the three known human cases of ABLV infection have shown a wide variability in the time it takes for symptoms to appear following exposure to an infected animal (from several days to several years).

How are they spread?

Both rabies and ABLV are spread from infected animals to people through bites or scratches, or by being exposed to infected animals' saliva through the eyes, nose, mouth or broken skin. Only mammals can be infected. Overseas, dogs are the main transmitter of rabies. Other animals that transmit rabies overseas include bats, monkeys, foxes, cats, raccoons, skunks, jackals and mongooses.

In Australia, evidence of ABLV infection has been found in species of flying foxes/fruit bats and insect-eating microbats. **It is assumed that any bat in Australia could potentially carry ABLV.** The behaviour or appearance of a bat is not an accurate guide as to whether it is carrying the virus. The rabies and ABLV viruses are unlikely to survive outside the bat or animal for more than a few hours, especially in dry environments that are exposed to sunlight. Contact or exposures to bat faeces, urine or blood do not pose a risk of exposure to ABLV, nor do living, playing or walking near bat roosting areas, as long as bats are not handled. Apart from two horses, no wild or domestic animals in Australia have ever been found to be infected with ABLV.

Who is at risk?

People who handle bats in Australia are at risk of ABLV infection. People who come into contact with wild or domestic mammals, including bats, in a rabies endemic country are at increased risk of rabies infection.

How is it prevented?

The best protection against being exposed to rabies or other lyssaviruses (including ABLV) is to avoid handling any bat in Australia or overseas, or any wild or domestic land dwelling mammal in a country where there is a rabies virus risk. This includes bats and wild or domestic dogs, cats and monkeys. Only people who have been vaccinated against rabies and who have been trained in handling bats should ever handle bats or flying foxes. Anyone who comes across an injured bat should contact the local Wildlife Information Rescue and Education Service (WIRES) network on 1300 094 737 or visit their website www.wires.org.au. WIRES have trained staff who can deal with bats safely. A private veterinarian may also be able to offer assistance and advice. Do not touch the bat and avoid direct contact with any bat saliva.

Rabies vaccine is used to protect against rabies and ABLV infection before a potential exposure. A course of three injections, given over one month, is recommended for people whose job or other activities place them at increased risk of being bitten or scratched by bats in Australia or mammals in rabies endemic countries. Periodic booster doses of vaccine may also be required. Rabies vaccination may also be recommended for people who travel to a rabies endemic country, depending on the circumstances (see the *Rabies Information Sheet for Travellers* for further information).

Rabies infection may also be prevented following an exposure through proper wound care and, depending on the outcome of a risk-assessment, by a series of injections known as post-exposure prophylaxis (PEP) or post-exposure treatment (PET) - see below for [advice on what to do if potentially exposed](#).

What should I do if bitten, scratched or exposed to a potentially rabid animal?

Even if previously vaccinated, if you are bitten or scratched by a bat anywhere or by a land dwelling mammal overseas, you should:

- **immediately wash the wound thoroughly with soap and water for at least five minutes** - proper cleansing of the wound reduces the risk of infection
- **apply an antiseptic with anti-virus action** such as povidone-iodine, iodine tincture, aqueous iodine solution or alcohol (ethanol) after washing
- **seek medical attention as soon as possible** to care for the wound and to assess whether you are at risk of infection

If you are at risk of infection, you may require treatment consisting of a combination of rabies immunoglobulin and rabies vaccine. If you have not been vaccinated previously, you will require an injection of rabies immunoglobulin as soon as possible and a series of either four or five rabies vaccine injections over one month. If you have been vaccinated before with a full course of vaccination, you will require two further doses of vaccine. In NSW, Public Health Units will work with your doctor to assess your risk and where indicated, will arrange for rabies vaccines and immunoglobulin to be delivered to your GP or hospital.

If exposure occurs while abroad, wherever possible, you should seek treatment as soon as possible in that country. Rabies immunoglobulin may be difficult to obtain in some countries but vaccine is usually available. If you do receive treatment while abroad, you should ask for a post-exposure prophylaxis (PEP) certificate, and as much written details about treatments received as possible, preferably in English (see the *Rabies Information Sheet for Travellers* for details).

If the animal or bat can be observed or tested without placing other people at risk, health authorities may decide to delay your treatment for a short period of time. In Australia, testing of bats can be arranged by local public health units. If it is found that the animal is not a rabies risk, the course of vaccinations will not be required and can be ceased.

How is it diagnosed?

Diagnosis of rabies and ABLV can be difficult and confirmation requires laboratory tests for the presence of the virus in skin, blood, spinal fluid and nervous tissue.

How is it treated?

There is no available treatment for rabies or ABLV once symptoms have started.

What is the public health response?

Doctors should contact their local Public Health Unit for advice on people bitten or scratched by animals or bats that could transmit rabies or ABLV. Public Health Unit staff will help arrange vaccination following exposure and rabies immunoglobulin where required. Hospitals and laboratories will notify cases of rabies and ABLV infection to the local public health unit. Public Health Unit staff will investigate the likely source and determine whether others may be at risk of infection.

Further information

For further information please call your local Public Health Unit on 1300 066 055 or visit the NSW Health [website](#).

For information regarding domestic animals that have been exposed to sick bats, please visit the NSW Department of Primary Industries [website](#).

Appendix 6 - Rabies Information Sheet for Travellers

Rabies Information Sheet for Travellers

Last updated: 30 November 2015

Rabies risk varies depending on where you are travelling and what activities are planned while abroad. The World Health Organisation (WHO) maintains [maps of rabies-endemic countries](#), and The UK Health Protection Agency (HPA) maintains a [list of rabies risk in land dwelling animals by country](#). Generally, the risk is highest in developing countries across Asia (including Bali), Africa and Central and South America; however, animals in developed countries have the potential to be infected and spread rabies.

Regardless of your destination, you should take the following measures to reduce your and your family's risk of contracting rabies:

- **Talk to your doctor about pre-travel rabies vaccination at least 1 month before departure** (to allow enough time to receive a full vaccine course if required). Your doctor may recommend being vaccinated depending on the places you are planning to visit, your likelihood of interacting with animals, your access to emergency medical attention while abroad, and your personal health circumstances.
- **Avoid contact with all wild and domestic animals** (especially dogs, cats, bats and monkeys), and take precautions to avoid being bitten or scratched, even if previously vaccinated:
 - Do not allow young children to feed, pat or play with animals; their height makes them particularly vulnerable to high-risk bites to the face, head and neck
 - Avoid contact with stray dogs and cats, and remain vigilant when walking, running, cycling, riding scooters, or other activities that may provoke an animal to attack
 - Do not carry food in the vicinity of monkeys and do not feed, pat or play with monkeys or bats, even in popular tourist areas where travellers may be encouraged to interact with these animals.

What should I do if bitten, scratched or exposed to a potentially rabid animal?

Even if previously vaccinated, if you are bitten or scratched by a bat anywhere or by a land dwelling mammal overseas, you should:

- **Immediately wash the wound thoroughly with soap and water for at least five minutes** - proper cleansing of the wound reduces the risk of infection
- **Apply an antiseptic with anti-virus action** such as povidone-iodine, iodine tincture, aqueous iodine solution or alcohol (ethanol) after washing
- **Seek medical attention as soon as possible** to care for the wound and to assess whether you are at risk of infection and require preventive treatment.

If exposure occurs while abroad, wherever possible you should seek treatment as soon as possible in that country. Rabies immunoglobulin may be difficult to obtain in some countries but vaccine is usually available.

If you do receive treatment while abroad, you should ask for a post-exposure prophylaxis (PEP) certificate, and obtain the following details (preferably in English), including the:

- Contact details for the clinic attended (telephone and email address)
- Batch and source of immunoglobulin (RIG) used (note: equine RIG rather than human RIG may be used in some countries)
- Volume of RIG administered
- Type of vaccine used
- Vaccine batch number
- Number of vials used
- Route of vaccine administration
- Date/s of RIG and/or vaccine administration.

Upon returning to Australia, you should see a doctor to reassess the risk and complete the course of treatment where required. In NSW, your local public health unit will work with your doctor to assess your risk, and where indicated, will arrange for rabies vaccines and immunoglobulin to be delivered to your GP or hospital.

If the animal or bat can be observed or tested without placing other people at risk, health authorities may decide to delay your treatment for a short period of time. If it is found that the animal is not a rabies risk, the course of vaccinations will not be required and can be ceased.

Appendix 7 - PHU rabies virus and other lyssaviruses (including ABLV) follow-up checklist

Patient ID number: _____

1. If potential exposure to rabies or other lyssaviruses (incl. ABLV):

Contact the exposed person (or care-giver) to:

- Identify source and circumstances of potential exposure, including identification of bat species if possible
- Determine if any other persons or animals were exposed to same animal/bat
- Determine if animal/bat available for testing and arrange testing where appropriate – refer to the [Guidelines for testing bats involved in human exposures](#) on PopNet.
- Review exposed person's vaccination status and immune competence, and discuss need for post-exposure treatment (PET) and prophylaxis (PEP) and if they have a preferred doctor to manage provision of PET
- Confirm risk assessment with senior PHU staff, and determine required timeframe for commencing PEP using the [Principles of Post-Exposure Risk Assessments and Timelines](#) on PopNet
- Provide with [Rabies and ABLV Factsheet](#).

Contact exposed person's doctor to:

- Discuss need for PET, including wound management and provision of PEP
- Complete [Rabies virus and other lyssaviruses \(including ABLV\) post-exposure prophylaxis form](#)
- Arrange for timely delivery of vaccine and HRIG to doctor, as appropriate.

Other issues:

- Enter details of exposure, PET and animal testing onto NCIMS.

2. If human rabies or ABLV case:

Contact the patient's doctor to:

- Obtain patient's history
- Confirm results of relevant pathology tests
- Recommend that the tests be done if needed.

Contact the patient (or care-giver) to:

- Confirm onset date and symptoms of the illness
- Identify likely source of exposure including type of animal/bat and type of exposure
- Determine if any other persons/animals were exposed to same animal/bat
- Provide [Rabies and ABLV Factsheet](#).

Contact laboratory to:

- Obtain any outstanding results

Confirm case:

- Assess information against case definition

Other issues:

- Report details of case to state/territory communicable diseases branch and senior managers as appropriate
- Enter case data onto NCIMS