

Guideline

Management of children presenting with potential Lyssavirus (rabies) exposures:

Emergency Management in Children

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| Author/custodian | Director, Infection Management and Prevention service, Immunology and Rheumatology | | | Review date | 20/06/2021 |
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| Applicable to | All Children's Health Queensland staff | | | | |
| Authorisation | Executive Director Clinical Services (QCH) | | | | |

Purpose

This guideline provides recommendations regarding best practice for the evaluation and management of potential Lyssavirus exposures (including rabies and Australian bat lyssavirus).

Scope

This guideline applies to all staff involved in the care and management of children with potential Lyssavirus exposure

Guideline

Background

Rabies remains a significant public health problem globally, causing approximately 60,000 deaths per year. The majority of cases occur in Asia and Africa where transmission from dog bites predominates. Australians travelling abroad also frequently report potential exposures to rabies.

Classical rabies has not been found in Australia, but Australian Bat Lyssavirus (ABLV) is present within the Australian bat population and has caused at least three fatal human infections.¹⁻³

Transmission to humans occurs through direct inoculation of saliva from an infected primary host, typically via a bite or scratch. Mammals often lick their paws/nails in order to groom or saliva contaminates paws (or

nails) during feeding. In the United States of America (USA) bat rabies has been diagnosed in cases without a clear history of bat inflicted injury, reinforcing the need for a risk averse approach in the setting of potential exposures.⁴

The incubation period following significant exposure to lyssavirus can range from a few days to several years. Post-exposure prophylaxis (PEP) is almost universally effective if administered in full prior to onset of clinical symptoms. Clinical disease manifests with encephalitis and brain stem dysfunction and is almost invariably fatal.

Potential Lyssavirus exposures

In the context of a potentially significant exposure, a careful history should include:

- Nature of the exposure
- Country of the exposure
- First aid management
- Immunisation history (including precise details of any rabies vaccine or immunoglobulin given pre-exposure or post-exposure, as well as tetanus vaccination status)
- Allergies to vaccine components (the vaccine Rabipur® contains egg protein)
- Immune suppression – whether through illness or treatment
- Potential exposure of any other persons

A potential exposure to lyssavirus is defined by the Communicable Disease Network of Australia (CDNA) as:

- 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, or a wild or domestic terrestrial mammal in a rabies-enzootic country.
- Where there is laboratory confirmation of infection with any lyssavirus from any wild or domestic terrestrial mammal in Australia, any bite or scratch from, or mucous membrane or broken skin contact with the saliva or neural tissues of that animal should be regarded as a potential exposure.⁵

Further information about the worldwide epidemiology of rabies can be found at

<http://www.who.int/rabies/epidemiology/en/>.

Rabies is considered enzootic in mammals throughout Africa, Asia, parts of Europe and North and South America. Bats, of any species, anywhere in the world are considered to be carriers of bat rabies. In addition, all Australian flying foxes and microbats should be considered to be carrying ABLV unless proven otherwise through testing of the animal's brain.

All exposures (even minor) to bats should be considered significant. Nibbling, minor scratches or abrasions without bleeding; or playing with dead bats should all be considered potentially significant.

Activities that are not considered to pose significant risk of lyssavirus transmission include: touching or feeding animals, licks to intact skin, exposure to blood, urine or faeces and exposure to animals which have been dead for several hours. In these situations, post-exposure prophylaxis (PEP) is not generally required⁵, however each case should be assessed on it's own merits. Please contact Public Health for advice.

There are a range of other encounters where potential exposure to lyssavirus may be difficult to exclude, for example an unattended young child found with a bat in a room.



ALERT

Seek advice from consultant ID paediatrician and Public health for all potential Lyssavirus exposures

Public Health Notification

All potential lyssavirus exposures should be notified verbally to the relevant public health unit, who will also facilitate supply of rabies vaccine and immunoglobulin when indicated. Depending upon the patient's address, for cases managed at the Queensland Children's Hospital, potential exposures should be notified by telephone to:

Metro North Public Health Unit - phone 07 3624 1111; After hours 07 3646 1699

Metro South Public Health Unit - phone 07 3176 4000; After Hours 07 3176 4040

Emergency Department Management

Children presenting with a potential lyssavirus exposure should be triaged according to clinical evaluation and reviewed promptly by a senior medical officer.

- Priority should be given to wound first aid management and analgesia.
- The management of all potential lyssavirus exposures requires consultation with Public Health and Paediatric Infection Management consultant.
- The initial management of a potential lyssavirus exposure will be carried out in the Emergency Department, with follow-up management co-ordinated between the patient's General Practitioner (GP) and Public Health.
- To facilitate management of potential lyssavirus exposures an **Emergency Department checklist** is available below (Appendix 1).

Wound Management

Use Droplet precautions, including protective eyewear, gloves, gowns and masks during procedures where contact with patient respiratory secretions is likely, provide adequate protection against the theoretical possibility of human to human transmission in a healthcare setting.

Wash all wounds thoroughly for at least 5 minutes with soap and water. Apply a virucidal antiseptic solution such as povidone-iodine or alcohol. Avoid suturing wounds if possible, at least until after commencement of post-exposure prophylaxis. Consideration should also be given to the possibility of tetanus and other wound infections, and appropriate measures taken.

Post-exposure Prophylaxis (PEP)

Most children with a potential exposure to lyssavirus will fall into one of the following categories. They should be managed according to specific [CDNA National Guidelines for Public Health Units](#) and the recommendations found in the [Australian Immunisation Handbook](#), in consultation with the Public Health Unit and the on-call paediatric infection management consultant.^{5, 6}

Children who are deemed to have had a potential exposure should commence one of the following PEP regimens as soon as possible after the exposure according to their history of previous rabies vaccination:

| If no prior rabies vaccination - management | |
|---|---|
| 1. Wound Management | Wash the wound(s) thoroughly as described above |
| 2. Wound infiltration with human rabies immune globulin (HRIG) | <p>Wound infiltration: HRIG dose = 20 international units x weight (kg)</p> <ul style="list-style-type: none"> • Use exact calculated dose • It is imperative that as much of the calculated dose of HRIG as possible be injected into the wound(s). • If insufficient volume HRIG can be diluted with sodium chloride 0.9% if necessary. • Any remaining HRIG that cannot be safely infiltrated in and around the wound (the whole dose in cases with mucosal exposure only) can be given by IM injection into the ipsilateral deltoid muscle or anterolateral thigh • The infiltration of HRIG is painful. • Consideration needs to be given to appropriate analgesia and if necessary, procedural sedation. • Topical and local anaesthetic (LA) infiltration into the wound is contraindicated, as it may dilute HRIG and lessen its effectiveness. • Consider proximal nerve blockade (eg ring block) if applicable. <p>Comments:</p> <ul style="list-style-type: none"> • During periods of national shortage of Imogam® HRIG, as an alternative product Kamrab® may be used. This requires SAS approval and patient consent. (Forms to be completed and sent to Public Health) Kamrab® is sourced by Public Health and supplied directly to the Emergency department/Pharmacy. |
| 3. Rabies vaccine administration | <p>Check patient allergies</p> <ul style="list-style-type: none"> • Rabies vaccine Rabipur® is egg-based. • For children with a known or suspected egg allergy, the alternate vaccine Merieux® can be utilised. <p>Administer rabies vaccine 1mL by IM injection into contralateral deltoid or anterolateral thigh. It must be administered away from the site of HRIG.</p> <ul style="list-style-type: none"> • The vaccine dose is the same for infants, children and adults, regardless of age or weight. <p>Four doses of rabies vaccine are given in total (on days 0, 3, 7 and 14).</p> <ul style="list-style-type: none"> • Immunosuppressed children may require an additional fifth dose on Day 28 and should be discussed with the on-call paediatric infection management consultant in every case. <p>Area of injection is subject to age of the child – refer to Guidelines for Maximal Amounts of solutions to be Injected into Muscle Tissue in CHQ-PROC-01039 Medication – Administration.</p> <ul style="list-style-type: none"> • In infants under 12 months of age, administration into the anterolateral aspect of the thigh is recommended. • For 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. |

| If previously received a full documented course of rabies vaccination (either Pre exposure prophylaxis (PrEP) or Post Exposure Prophylaxis (PEP)) | |
|--|--|
| 1. Wound Management | <ul style="list-style-type: none"> Wash the wound thoroughly as described above. Documentation of a completed recommended PreP or PEP rabies vaccine regimen is required. 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 more than or equal to 0.5 international units/mL. |
| 2. Rabies vaccine administration | <p>Check patient allergies</p> <ul style="list-style-type: none"> Rabies vaccine Rabipur® is egg-based. For children with a known or suspected egg allergy, the alternate vaccine Merieux® can be utilised. <p>Administer rabies vaccine 1mL by IM injection into contralateral deltoid or anterolateral thigh. It must be administered away from the site of HRIG.</p> <ul style="list-style-type: none"> Two doses of rabies vaccine are given in total (on day 0 and 3). The vaccine dose is the same for infants, children and adults, regardless of age or weight. <p>Area of injection is subject to age of the child – refer to Guidelines for Maximal Amounts of solutions to be Injected into Muscle Tissue in CHQ-PROC-01039 Medication – Administration.</p> <ul style="list-style-type: none"> In infants under 12 months of age, administration into the anterolateral aspect of the thigh is recommended. For 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. |

| If post exposure treatment has been commenced overseas | |
|---|--|
| 1. Check patient's records | Patient will often have a vaccine record card or receipt. Place a copy in their chart and include in fax to Public Health Unit. |
| 2. Contact Public health unit and Paediatric infection management team | Manage in consultation with the Public Health Unit and on-call paediatric infection management consultant. |

Follow-up

The initial management of potential lyssavirus exposures may be carried out in the Emergency Department (ED), but in most cases subsequent vaccinations and follow-up should be arranged through the General Practitioner, with the assistance of the Public Health Unit.

Documentation of presentation to the ED:

- Clear documentation of assessment, treatment and follow up
- Complete a case report form which should be faxed to the Public Health unit which is attached to this guideline and also located on the department website
- Ensure discharge letter to GP and Public Health.

Other considerations

In children with wounds following contact with animals, other considerations include the risk of tetanus transmission and the risk of bacterial wound infections.

It should be determined if any other individuals (for example family members) have had potential lyssavirus exposure requiring assessment and/or treatment.

If the bat is available, it may be able to be tested promptly for the presence of ABLV. This can be arranged as a priority through Public Health. The bat should be contained so as to avoid further injury to others.

Suspected Lyssavirus Infection

If lyssavirus infection is suspected on clinical grounds, the on-call paediatric infection management consultant will provide advice regarding appropriate investigations and management. Intensive care support will be required in every case. If lyssavirus is confirmed, survival is unlikely.

Human to human transmission has not been proven to occur.

Standard precautions, including protective eyewear, gloves, gowns and masks during procedures where contact with patient secretions is likely, provide adequate protection against the theoretical possibility of human to human transmission in a healthcare setting.

Resources

- [Appendix 1 Potential Lyssavirus Exposure Checklist for Children Presenting to Emergency](#)
- [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](#)
- [Queensland Health Fact Sheet on Australian Bat Lyssavirus](#)
- [Queensland Health Fact Sheet on Rabies](#)
- [Queensland Health Lyssavirus \(Potential Exposure\) Case Report Form](#) (look for ABLV or rabies case report form)
- [Queensland Health Information on Rabies vaccine and human rabies immunoglobulin](#)
- [CHQ-GDL-01023: Tetanus Prophylaxis in Wound Management](#)

Consultation

Key stakeholders who reviewed this version:

- Public health Medical Officers (Metro-North and Metro-South Public Health units)
- Paediatric Emergency Medicine Consultants, QCH
- Director, Infection Management and Prevention service, Immunology and Rheumatology, QCH
- Paediatric Infection Specialists, QCH
- Nurse Practitioner, QGIS, QCH
- Pharmacist Advanced - Antimicrobial Stewardship, QCH
- Pharmacist Advanced – Safety and Quality, QCH

Definition of terms

| Term | Definition |
|------|---|
| ABLV | Australian Bat Lyssavirus |
| CDNA | Communicable Disease Network of Australia |
| CHQ | Children's Health Queensland |
| ED | Emergency department |
| GP | General Practitioner |
| HRIG | human rabies immune globulin |
| ID | Infectious diseases |
| IU | International units |
| LA | Local Anaesthetic |
| PEP | Post exposure prophylaxis |
| PrEP | Pre exposure prophylaxis |
| QAS | Queensland Ambulance Service |
| QCH | Queensland Children's Hospital |
| SAS | Special Access Scheme |
| VnAB | Rabies Antibodies |

References and suggested reading

1. Samaratunga H, Searle JW, Hudson N. Non-rabies Lyssavirus human encephalitis from fruit bats: Australian bat Lyssavirus (pteropid Lyssavirus) infection. *Neuropathol Appl Neurobiol.* 1998;24(4):331-5. Epub 1998/10/17.
2. Hanna JN, Carney IK, Smith GA, Tannenberg AE, Deverill JE, Botha JA, et al. Australian bat lyssavirus infection: a second human case, with a long incubation period. *Med J Aust.* 2000;172(12):597-9. Epub 2000/07/29.

3. Francis JR, Nourse C, Vaska VL, Calvert S, Northill JA, McCall B, et al. Australian Bat Lyssavirus in a child: the first reported case. *Pediatrics*. 2014 Apr;133(4):e1063-7. doi: 10.1542/peds.2013-1782. Epub 2014 Mar 3.
4. De Serres G, Dallaire F, Cote M, Skowronski DM. Bat rabies in the United States and Canada from 1950 through 2007: human cases with and without bat contact. *Clin Infect Dis*. 2008;46(9):1329-37. Epub 2008/04/19.
5. Communicable Disease Network Australia. Rabies virus and other lyssavirus (including Australian Bat Lyssavirus) exposures and infections. 2014 [11 April 2019]; Available from: <http://www.health.gov.au/internet/main/publishing.nsf/Content/cdna-song-abvl-rabies.htm>
6. The Australian Immunisation Handbook – Vaccine preventable diseases - Rabies and other lyssaviruses. 2018 [11 April 2019]; 10th edition: Available from: <https://immunisationhandbook.health.gov.au/vaccine-preventable-diseases/rabies-and-other-lyssaviruses>


Guideline revision and approval history

| Version No. | Modified by | Amendments authorised by | Approved by |
|---------------------|---|------------------------------------|--|
| 1.0 (13/04/2017) | Director Paediatric Emergency Department | Divisional Director, Critical Care | Executive Director Hospital Services |
| 2.0 (20/06/2019) | Director Paediatric Emergency Department Director IMPS, Immunology and Rheumatology Public Health Medical Officer Pharmacist Advanced – Antimicrobial Stewardship Nursing Practitioner (QSIG) | CHQ Medicines Advisory committee | Executive Director Clinical Services (QCH) |

| | |
|---------------------------------|---|
| Keywords | Rabies, Lyssavirus, bat, post exposure prophylaxis, PEP, pre-exposure prophylaxis, PrEP, HRIG, human rabies immunoglobulin, paediatric, ABLV, 00719 |
| Accreditation references | National Safety and Quality Health Service Standards (1-8): Standard 3: Preventing and Controlling Healthcare-Associated Infection Standard 4: Medication Safety Standard 12: Provision of Care |

Appendix 1:

Available via QHEPS: https://qheps.health.qld.gov.au/_data/assets/pdf_file/0017/708020/658991.pdf

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|---|------------------|---|---|
|  <p>Children Presenting to Emergency after Potential Lyssavirus Exposure Checklist</p> | | (Affix patient identification label here) | |
| Date and time of presentation: | | URN: | Family Name: |
| | | Given Names: | Address: |
| | | Date of Birth: | Sex: <input type="checkbox"/> M <input type="checkbox"/> F <input type="checkbox"/> I |
| This document is to be used in collaboration with the CHQ Guideline Management of children presenting with potential Lyssavirus exposures at Queensland Children's Hospital . Ensure Droplet precautions - including protective eyewear, gloves, gowns and masks where contact with patient respiratory secretions is likely. | | | |
| First Aid and Wound Management: (Expeditious) | | | |
| • Wash the wound thoroughly for at least five (5) minutes with soap and water followed by virucidal antiseptic e.g. povidone-iodine or alcohol (if patient presents with older wound, still utilise first aid methods if < 48hrs old) | | | Time completed: |
| • Analgesia consideration – treat any signs of discomfort with appropriate analgesia | | | |
| Pain Score: | Analgesia given: | | |
| • Medical Review and careful history taking | | | |
| Nature of exposure: | | Country of exposure: | |
| First Aid management: | | | |
| Immunisation history (include precise details of any rabies vaccine or immunoglobulin given pre-exposure or post exposure, as well as tetanus vaccination status): | | | |
| Allergies: | | | |
| Does this patient have a known egg allergy? <input type="checkbox"/> Y <input type="checkbox"/> N ALERT: Rabipur is egg-based, use Merieux if allergic to egg | | | |
| • Consideration for Emla/LMX 4/Laceraine to be applied to IM injection site (Amethocaine not to be used for IM sites due to vasodilation effect). Topical local anaesthetic creams contraindicated for use on open wounds. | | | |
| Time applied: | IM site: | IV site: | |
| It is imperative as much as possible of the calculated dose of Human Rabies Immunoglobulin (HRIG) is injected in the wound. If any remaining HRIG it can be injected into the deltoid muscle or thigh (same side). Vaccine must be given contralateral to the wound, preferably in the deltoid, and never in the same site as HRIG. | | | |
| <input type="checkbox"/> SMO notification and review (ALL cases must be reported to and reviewed by SMO) | | | |
| <input type="checkbox"/> Infectious Diseases notification All cases must be discussed with ID Consultant on-call (contact through switchboard) | | | |
| <input type="checkbox"/> Public Health notification All cases must be discussed with public health (contact through switchboard) | | | |
| <input type="checkbox"/> Pharmacy notification (Rabies HRIG and vaccine stock kept at QCH Pharmacy – ID will provide release instructions to pharmacy during hours, and on-call Pharmacist after hours) | | | |
| <input type="checkbox"/> Consideration of procedural sedation – infiltration of HRIG is a painful procedure; ensure adequate analgesia / sedation in response to clinical need, age of patient, size and site of wound. ALERT: Injected LA is contraindicated | | | |
| Analgesia / sedation method chosen: | | | NBM from: |
| NO PREVIOUS RABIES VACCINE | | | |
| • Wound infiltration [HRIG DOSE (IU) = Wt (kg) x 20 IU/kg] | | | |
| Patient weight: | Dose (IU): | Dose (mLs): | |
| <input type="checkbox"/> When KAMrab used, patient/carer consent obtained and SAS approval completed and copy faxed to PHU | | | |
| <input type="checkbox"/> Rabies vaccine (separate IM injection opposite side to wound and preferably in deltoid) – date: / / | | | |
| Rabies vaccine: | Type: | Batch: | |
| Site: | Date: | Time: | |
| PRIOR RABIES VACCINE | | | |
| • If prior rabies vaccine (refer to guideline) administer Rabies Vaccine only in contralateral deltoid – date: / / | | | |
| Rabies vaccine: | Type: | Batch: | |
| Site: | Date: | Time: | |
| • Consider need to cover wound with a light dressing | | | |
| • Follow-up coordinated by Metro South Public Health Unit (3176 4000; after hours 3176 4040) or Metro North Public Health Unit (3624 1111; after hours 3646 1699). Patients without prior rabies vaccines require follow-up vaccines on Days 3, 7, 14 (additional dose may be required for immunocompromised patients) | | | |
| • If previous rabies vaccine then follow-up vaccine required on Day 3 | | | |
| <input type="checkbox"/> GP discharge letter completed <input type="checkbox"/> Clear discharge advice provided to child & family – aware of need for follow up vaccines | | | |
| RN name: | Signature: | MO name: | Signature: |
| Date: | | Date: | |

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v3.00 - 07/2019

