Manitoba
Health, Healthy Living and Seniors

Public Health and Primary Health Care
Communicable Disease Control
4th Floor, 300 Carlton St, Winnipeg, MB R3B 3M9
T 204 788-6737 **F** 204 948-2040
www.manitoba.ca

January 15, 2016

Dear Health Care Provider:

Re: Reporting and Investigation of Human Cases of Rabies (Rabies virus)

Reporting of Human Cases of Rabies (Rabies virus)

Laboratory:

- All positive laboratory results for rabies virus in humans are reportable to the Public Health Surveillance Unit by secure fax (204-948-3044). A phone report must be made to a Medical Officer of Health at 204-788-8666 on the **same day** the result is obtained, **in addition** to the standard surveillance reporting by fax.

Health Care Professional:

- Probable (clinical) cases of human rabies are reportable to the Public Health Surveillance Unit by telephone (204-788-6736) during regular hours (8:30 a.m. to 4:30 p.m.) AND by secure fax (204-948-3044) on the **same day** that they are identified. After hours telephone reporting is to the Medical Officer of Health on call at (204-788-8666). The *Clinical Notification of Reportable Diseases and Conditions* form (http://www.gov.mb.ca/health/publichealth/cdc/protocol/form13.pdf) should be used.
- Cooperation in Public Health investigation is appreciated.

Regional Public Health or First Nations Inuit Health Branch (FNIHB):

- Once the case has been referred to Regional Public Health or FNIHB, the *Communicable Disease Control Investigation* form (http://www.gov.mb.ca/health/publichealth/cdc/protocol/form2.pdf) should be used and returned to the Public Health Surveillance Unit by secure fax (204-948-3044).

Reporting of an Animal Bite:

- For a suspected human exposure to rabies virus (e.g., animal bite) the *Report of Suspected Rabies Exposure* form *(*http://www.gov.mb.ca/health/publichealth/cdc/protocol/form9.pdf) should be used and faxed back to the relevant Regional Public Health office. Contact details are on page 3 of the form.

Sincerely,

"Original Signed By"

Richard Baydack, PhD
Director, Communicable Disease Control
Public Health and Primary Health Care
Manitoba Health, Healthy Living and Seniors

"Original Signed By"

Carla Ens, PhD
Director, Epidemiology & Surveillance
Public Health and Primary Health Care
Manitoba Health, Healthy Living and Seniors

Manitoba
Health, Healthy Living and Seniors

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April 1, 2014

Dear Health Care Providers:

Re: Management of Animal Exposures to Prevent Human Rabies

As of April 1, 2014, the Canadian Food Inspection Agency (CFIA) will no longer be involved with rabies management. The Manitoba departments of Health, Healthy Living & Seniors (MHHLS), Agriculture, Food & Rural Development (MAFRD) and Conservation & Water Stewardship (CWS) will now collectively coordinate the rabies program as Manitoba Rabies Central.

The CFIA will continue to test animal specimens for rabies. However, sample collection, specimen shipping, and dissemination of testing results to relevant health officials in the affected region will be coordinated centrally by rabies staff from MHHLS, MAFRD and CWS.

- Any animal suspected of transmitting rabies to a human or another animal should be reported by the local/regional MOH or Public Health Nurse to MHHLS.
- Health care providers should now contact MHHLS to request that a sample related to an active rabies investigation be collected and submitted to the CFIA for rabies testing.
- MHHLS can also be contacted for follow up on samples submitted for testing.
- Risk assessment and rabies-related advice can now be obtained by contacting MAFRD and speaking to a provincial veterinarian.

Note that reference to the CFIA in the current protocol should be replaced with the relevant provincial department and phone number as indicated below:

- Manitoba Health, Healthy Living & Seniors – 204-788-8666
- Manitoba Agriculture, Food & Rural Development – 204-470-1108

Sincerely,

"Original Signed By"

Richard Baydack, PhD
A/Director, Communicable Disease Control

"Original Signed By"

Richard Rusk, DVM, MD, CCFP, MPH
Medical Officer of Health

Rabies

Protocol for Management of Human Rabies and Management of Animal Exposures to Prevent Human Rabies

MAY 2012

COMMUNICABLE DISEASE CONTROL

Manitoba

Rabies: Protocol for Management of Human Rabies and Management of Animal Exposures to Prevent Human Rabies

Manitoba

Communicable Disease Control Branch

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1. Human Rabies Case Definition

1.1 Confirmed Case

Clinical illness[a] and laboratory confirmation of infection including at least one of:

- detection of rabies virus antigen by fluorescent antibody (FA) in an appropriate clinical specimen, preferably the brain or the nerves surrounding hair follicles in the nape of the neck

  OR

- isolation of rabies virus from saliva, cerebrospinal fluid (CSF), or central nervous system tissue using cell culture or laboratory animal

  OR

- detection of rabies virus RNA in an appropriate clinical specimen (e.g., saliva, tissue, CSF) (1).

Negative results for the above tests do not rule out rabies infection because viral material may not be detectable (e.g., early in infection). CSF frequently remains negative (1).

1.2 Probable Case

Clinical illness[a] and at least one of:

- demonstration of rabies-neutralizing antibody (complete neutralization) in the serum or CSF of a non-vaccinated person (1)

  OR

- confirmed exposure with an appropriate incubation time.

A negative serological result does not rule out rabies as antibody does not always develop and when it does, is frequently only detectable beginning one week following the presentation of symptoms.

2. Reporting and Other Requirements

2.1 Reporting of Rabies in Humans

Laboratory:

- All positive diagnostic human results from laboratory tests are reportable to the Public Health Surveillance Unit by telephone (204-788-8666) and secure fax (204-948-3044) on the same day that they are obtained.
- Operators of clinical/medical laboratories in Manitoba are required to submit sera from probable and confirmed cases of rabies to Cadham Provincial Laboratory (CPL). Nape of the neck or brain specimens intended for specific rabies diagnostic testing must also be submitted to CPL.

Health Care Professional:

- Same day reporting by telephone (204-788-8666) and secure fax (204-948-3044) to the Public Health Surveillance Unit is required when a health care professional becomes aware that a person meets or has recently met the confirmed case definition for human rabies (form available at: www.gov.mb.ca/health/publichealth/cdc/protocol/form2.pdf).
- Probable (clinical) cases should be reported by following the instructions on the form available at: http://www.gov.mb.ca/health/publichealth/cdc/protocol/form13.pdf.
- Adverse events following immunization should be reported by health care professional within seven days of becoming aware of the event (form available at: www.gov.mb.ca/health/publichealth/cdc/docs/aefi_form.pdf).

2.2 Reporting of Rabies in Animals

- A person who is a veterinarian, an officer appointed under *The Wildlife Act* or *The Provincial Parks Act*, an inspector appointed or designated under *The Animal Diseases Act* or a wildlife biologist must report to Manitoba Health, Public Health Surveillance Unit when they become aware that an animal in Manitoba has or may have rabies.
- A person in charge of a Canadian Food Inspection Agency (CFIA) veterinary laboratory must report a positive or negative test result for rabies in an animal in Manitoba to the appropriate regional health authority when a human contact exposure has occurred from the animal. The information is then forwarded on to Manitoba Health, Public Health Surveillance Unit.

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a Rabies is an acute encephalomyelitis that almost always progresses to coma or death within 10 days after the first symptom (1).

3. Clinical Presentation/Natural History

The initial symptoms of rabies resemble those of other systemic viral infections and may include fever, headache, malaise and disorders of the upper respiratory and gastrointestinal tracts (2). After entry into the central nervous system, the virus causes an acute, progressive encephalomyelitis that is usually fatal (3, 4). The more common furious (encephalitic) form presents with classic symptoms of hydrophobia or aerophobia with a rapidly progressing encephalitis and death (5). The less common paralytic (dumb) form of the disease presents as progressive flaccid paralysis, has a more protracted course and is more difficult to diagnose (5). Differences in host immune response appear more likely to explain whether furious or paralytic rabies develops than do differences in the strains of virus that cause the natural infection (2, 6). Almost all cases die of the disease or its complications within a few weeks of onset (2).

4. Etiology

Rabies virus is an RNA virus of the family *Rhabdoviridae*, genus *Lyssavirus* (7).

5. Epidemiology

5.1 Reservoir and Source

For Humans: Globally, over 98% of all human rabies occurs following exposures to infected dogs (8). In developing countries, monkeys are the second most common source of human rabies (9). In developed countries, the animals that most often transmit rabies are foxes, skunks, bats and raccoons (9, 10). Over the past decade in North America, most human cases have had a bat exposure.

For Animals: In Canada, the most significant vectors are red foxes, bats and striped skunks (10, 11). Refer to http://www.inspection.gc.ca/english/anima/disemala/rabrag/statse.shtml for current information on rabies prevalence in Canada and http://apps.who.int/globalatlas/docs/rabies/RabnetManual_user.pdf or http://www.who.int/ith/en/ for rabies prevalence in other countries. In Canada, 45% of animal rabies cases occur in skunks (10), whereas in the USA, skunks make up 23% of cases (11).

In Manitoba, approximately 53 animals per year were identified as being rabies positive for 2001-2010 inclusive (10). For all years, 60-87% of identified rabies positive animals in Manitoba were skunks (10). On average, for 2001-2010 inclusive, one rabies positive bat per year was identified (10). Refer to Appendix A for more information on rabies in animals.

5.2 Transmission

Virus is most often transmitted by the saliva of a rabid animal introduced through a bite or scratch and rarely into a fresh break in the skin or through intact mucous membranes (3). Human-to-human transmission occurs almost exclusively as a result of organ or tissue transplantation (12). However, human-to-human transmission can occur in the same way as animal-to-human transmission (i.e., the virus is introduced into fresh open cuts in skin or onto mucous membranes from saliva or other potentially infectious material such as neural tissue) (12). Airborne transmission has been demonstrated in laboratory settings and suggested in caves with heavy bat infestations (3, 5), but alternate infection routes from bats in caves cannot be ruled out (13, 14). Ingestion of raw meat or other tissues from animals infected with rabies is not a known source of human infection (15).

5.3 Occurrence

General: It is estimated that 55,000 human deaths are caused by rabies each year, most of which occur in rural areas of Africa and Asia (15). The paralytic form of rabies is often misdiagnosed, contributing to underreporting of rabies (15). Rabies is most common in children under 15 years of age (15). In industrialized countries and in most urbanized areas of Latin America, human rabies is close to being eliminated due to the vaccination of domestic dogs and the implementation of other control measures (15). Although canine rabies is well controlled in North America, the proportion of human cases due to bat exposures is increasing (16). An average of 1-2 human rabies cases per year has occurred in the United States of America since 1960 (17).

Canada: Since 1924, 24 people have died of rabies in Canada: 12 in Quebec, six in Ontario, two each in Saskatchewan and Alberta and one each in British Columbia and Nova Scotia (18). The three most recent cases were reported in Quebec in 2000, British Columbia in 2003 and Alberta in 2007 (5, 19). All three cases were attributed to unrecognized bat exposures and were fatal (20).

Manitoba: There have been no reported human rabies cases since reporting began in Manitoba.

5.4 Incubation Period

Usually 20-60 days, but varies from a few days to years (5). Length of incubation depends in part on wound severity, location in relation to nerve supply, and relative distance from the brain; the amount and variant of virus; the degree of protection provided by clothing and other factors (3).

5.5 Host Susceptibility

All mammals are susceptible to infection; the degree of susceptibility may be influenced by some host factors (age, health, nutrition, etc.) (3). The human immune response to natural rabies infection is insufficient to prevent disease (2).

5.6 Period of Communicability

The length of time virus may be excreted in saliva before the development of symptoms has been determined only for domestic dogs, cats and ferrets (5). In these animals, rabies virus excretion does not generally precede symptom development by more than 10 days (5). Excretion in other animals is highly variable (3).

6. Laboratory Diagnosis in Humans

No tests are available to diagnose rabies infection in humans before the onset of clinical disease (15). Multiple specimens (e.g., saliva, CSF, serum, skin biopsy containing hair follicles from the nape of the neck) and tests (refer to Section 1, *Human Rabies Case Definition*) are usually required for antemortem laboratory diagnosis of rabies.

Brain biopsy specimens are required for postmortem diagnosis. Consult with Cadham Provincial Laboratory (CPL) (204-945-6123) to arrange specimen collection and transfer. Specimens will be forwarded by CPL to appropriate reference laboratories.

7. Key Investigations for Public Health Response

- Identification and management of human contacts of the case and likely animal source (refer to Section 8.2 for contact definition and management).
- Animal exposure and travel history of the case (e.g., previously unreported or unrecognized animal exposure). The rabies virus is more prevalent in animals in some countries than others (e.g., developing countries). Refer to Appendix A and http://www.inspection.gc.ca/english/anima/disemala/rabrag/statse.shtml for exposures in Canada and http://apps.who.int/globalatlas/docs/rabies/RabnetManual_user.pdf or http://www.who.int/ith/en/ for current information on rabies prevalence in animals in other countries.
- Immunization status of animal if applicable.
- Availability of animal for diagnostic testing or observation.

8. Control

8.1 Management of Human Cases

Treatment:

- Supportive. There is no effective established therapy once clinical disease develops (19).
- Consultation with Neurology, ICU and/or Infectious Diseases is strongly recommended.

Infection Control Measures:

- Routine Practices in health care.
- Articles in contact with saliva must be cleaned and disinfected following Routine Practices.

8.2 Management of Contacts of Human Cases

- Rabies post-exposure prophylaxis (RPEP) is indicated for contacts (e.g., household, health care workers) who are reasonably certain they were bitten by the patient or had mucous membrane or non-intact skin directly exposed to potentially infectious saliva or neural tissue (12). RPEP consists of human rabies immune globulin (RabIg) and rabies human diploid cell vaccine (HDCV) or rabies purified chick embryo cell vaccine (PCECV). Routine delivery of health care to a patient with rabies is not an indication for RPEP (12).
- If an exposure (as described above) has occurred, follow the wound management and RPEP instructions in Section 8.3 below.

8.3 Protocol for Management of Animal Exposures to Prevent Human Rabies

Occurrence of Exposures to Rabid Animals: In 2010, 10 instances of human contact with known rabies positive animals in Manitoba were reported to the Canadian Food Inspection Agency (CFIA). Three of the incidents involved bites, two from skunks and one from a cat. Seven of the incidents were from handling/other, with four from skunks and one each from a bat, horse and cat. There are also exposures to presumed rabid animals that were not captured for testing. In 2010, over 100 people received RPEP due to suspected or confirmed rabid animal exposures.

Animal Exposure Definition: One or more of the following exposures to potentially infective animals[b]:

- Bite: any penetration of the person's skin by the animal's teeth (12).
- Non-bite: a scratch (does not have to draw blood to be considered a potential exposure to rabies virus) or when saliva or other potentially infectious material (e.g., neural tissue) of the animal is introduced into fresh, open cuts in skin or onto mucous membranes of a person (12).
- Bat exposure:
  - A bite or non-bite exposure as defined above OR
  - There has been direct contact[c] with a bat AND a bite, scratch or saliva exposure into a wound or mucous membrane cannot be ruled out (21). In a child, any direct contact with a bat should be considered a reason for an intervention, including contact through clothes as a history to rule out a bite, scratch or mucous membrane exposure may not be reliable (21).
- Inhalation of aerosolized virus by spelunkers exploring caves inhabited by infected bats or by laboratory technicians homogenizing tissues infected with rabies virus (5). The efficacy of prophylaxis after such exposures is unknown (5).

Indirect contact and activities with potentially rabid animals (e.g., petting or handling an animal, contact with blood, urine or feces, and contact of saliva with intact skin) are not considered exposures requiring rabies post-exposure prophylaxis (12). Being sprayed by a skunk is also not considered an exposure (5). Exposures to reptiles or birds are not a concern as the virus does not survive in these organisms.

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b Contact with rodents who appear normal/healthy (e.g., wild mouse or squirrel OR pet gerbil, hamster, guinea pig, rat or rabbit which has never been outside of a building) does not qualify as an exposure except in highly unusual circumstances (e.g., In Saskatchewan in 2007, the CFIA did confirm rabies in a hamster that had escaped in a school that had bats and many children were exposed to the hamster.).

c Defined as the bat touching or landing on a person (21). Assessment can be difficult when a bat is found in the room with a child or adult who is unable to give a reliable history (21). Factors indicating that contact may have occurred include the individual waking up crying or the presence of a new bite or scratch mark (21).

Notes on Viability of Rabies Virus in Saliva:

- Virus is viable as long as the saliva is liquid.
- No one is known to have been exposed and infected with rabies by contact with saliva on a surface.
- Saliva with virus in it would be immediately diluted in any kind of wet environment (e.g., on wet dog just attacked by rabid animal, in water bowl/trough) and therefore of no concern.
- Saliva outside in sun would immediately dry.
- Saliva with virus exposed on intact skin is not an exposure.
- If a dog bit a rabid animal and then came to lick the owner's hands, it would not be an exposure as the virus would have likely been diluted and/or swallowed by the dog (22).

8.31 Reporting Requirements and Responsibilities After Exposure

Physician or Nurse not Including a Medical Officer of Health (MOH) or a Public Health Nurse:

- If a physician or nurse believes that a person has been exposed (e.g., bitten) to an animal or human and that there is a significant risk that rabies may have been transmitted, the physician or nurse must notify the appropriate regional Medical Officer of Health or Public Health Nurse based on the exposed person's current address*:
  - Medical Officers of Health contact list is available at: http://www.gov.mb.ca/health/publichealth/contactlist.html#3 . After hours: 1-204-788-8666.
  - If the person's current region of residence is unknown, the exposure should be reported to Health Links-Info Santé (204-788-8200) or (1-888-315-9257).
- The *Report of Suspected Rabies Exposure* available at: http://www.gov.mb.ca/health/publichealth/cdc/protocol/form9.pdf should be completed to the best extent possible and faxed to the region of the exposed person's current address along with any additional information requested. An alternate regional form/process acceptable to the regional health authority may be used. Reporting is not required if the biting animal was:
  - a pet gerbil, hamster, guinea pig, rat or rabbit which has never been outside of a building;
  - an apparently healthy and otherwise normally behaving mouse or squirrel that was provoked (e.g., chasing or handling/feeding).

Note: If there is uncertainty as to whether the exposure should be referred to the Regional Health Authority/First Nations Inuit Health, consultation with Public Health is recommended.

Medical Officer of Health or Public Health Nurse:

- Upon receiving notification of an exposure from a physician or nurse, the Medical Officer of Health or Public Health Nurse may if he or she believes it is possible that rabies has been transmitted, take steps to ensure the following where possible:
  - The animal is secured alive and without injury in a safe place;
  - The animal is kept securely under observation for 10 days or any longer period considered necessary in a manner that will not allow for further exposures to occur (refer to Appendix B); and
  - In consultation with the CFIA, the animal's head is preserved in ice and sent to a laboratory for examination, if the animal dies or shows symptoms of rabies during the observation period.

*Current address is defined as where the person is living during the exposure follow-up period.

- Any animal suspected of transmitting rabies to a human or another animal should be reported by the local/regional MOH or Public Health Nurse to the District Veterinarian of the Canadian Food Inspection Agency (CFIA). Contact information is available at: www.inspection.gc.ca/english/anima/heasan/offbure.shtml
- It is the responsibility of the Regional Health Authority or First Nations Inuit Health Office (based on the exposed person's current address) to arrange for release of human rabies immune globulin (RabIg) and rabies human diploid cell vaccine (HDCV) or rabies purified chick embryo cell vaccine (PCECV) by a Medical Officer of Health (MOH) if necessary. In Manitoba, release of RabIg requires MOH approval/authorization. During working hours, the regional MOH should be called (http://www.gov.mb.ca/health/publichealth/contact list.html#3). The after working hours contact number is 204-788-8666.
- Rabies post-exposure prophylaxis started after hours by the on-call MOH will be passed on to the appropriate region's Public Health/MOH for arrangement of follow-up doses.
- After follow-up is complete, the *Report of Suspected Rabies Exposure* should be completed and faxed to the Public Health Surveillance Unit (204-948-3044 secure fax).

Note: If relevant, refer also to Section 8.35 *Policy for Follow-up of Exposures that Cross Jurisdictional Boundaries.*

8.32 Wound Management

- All wounds should be thoroughly washed and flushed (for about 15 minutes, if possible) with soap or detergent and copious amounts of water as early as possible after the exposure (15). Povidone-iodine solution should be used to irrigate wounds (15) or 40%-70% ethanol if povidone-iodine is not available. If available, eye wash stations should be used for eye exposures (16).
- Decisions regarding the use of antibiotic prophylaxis and primary wound closure should be individualized on the basis of the exposing animal species, size and location of the wound(s) and the time interval since the bite (12).
- Suturing of wounds should be avoided when possible (12). If suturing is required, and RabIg is indicated (refer to Table 1 and Appendix D), RabIg should be administered before closing the wound(s).
- Puncture wounds and wounds contaminated with saliva are "dirty wounds"; tetanus-diphtheria combined toxoids should be given according to the recommendations in the current *Canadian Immunization Guide.*

8.33 Rabies Post-exposure Prophylaxis (RPEP)

Table 1: Rabies Post-exposure Prophylaxis (RPEP) for Persons not Previously Immunized Against Rabies (Adapted from the 2006 *Canadian Immunization Guide* recommendations)

Animal Species	Condition of Animal at Time of Exposure	Action
Dog, cat or ferret	Healthy appearance and is available for 10 days observation. Refer to Appendix B for more information on the observation period. Vaccination: Domestic pets with up-to-date vaccination are unlikely to become infected with rabies. If vaccinated animals exhibit signs suggestive of rabies, they must be carefully evaluated by a veterinarian (5).	None unless animal develops rabies, then immediately give RPEP. Educate client on prevention and local risk. Conditions supporting delaying RPEP initiation for observation include: if the animal was a domestic pet; fully vaccinated and provoked (refer to Appendix C).
	Rabid or suspected rabid. There is a higher index of suspicion if unimmunized or unprovoked attack (refer to Appendix C) or unknown condition (e.g., escaped[d]).	Animal is not available for testing[e] or testing results cannot be received within 48 hours of exposure: Consider RPEP based on risk assessment and educate client on prevention and local risk. Animal is available for testing[e] and testing results can be received within 48 hours of exposure: Do not begin RPEP; base decision on testing results. Educate client on prevention and local risk. Where RPEP has been initiated and the CFIA laboratory reports a rabies negative result in the animal, the Medical Officer of Health will determine if the vaccine series should be continued.
Skunk, fox, coyote, raccoon and most other carnivores, bat[f], exotic pets (other than ferrets)	Signs suggestive of rabies in wild animals • Unusually friendly or aggressive • Nocturnal animals wandering in daylight • Weakening and loss of flying ability in bats • Paralysis (26)	Animal is not available for testing or testing results cannot be received within 48 hours of exposure: Consider RPEP based on risk assessment and educate client based on local risk Animal is available for testing[e] and testing results can be received within 48 hours of exposure: Do not begin RPEP; base decision on testing results. Educate client on prevention and local risk. Where RPEP has been initiated and the CFIA laboratory reports a rabies negative result in the animal, the Medical Officer of Health will determine if the vaccine series should be continued.
Livestock, small rodents or lagomorphs (hares, rabbits), large rodents (woodchucks[g], beavers), other mammals	Consider individually. Rabid horses and cattle may present with difficulty swallowing and generate copious amounts of saliva posing a greater risk for non-bite exposures.	Consult appropriate public health and CFIA officials. Bites from squirrels, hamsters, guinea pigs, gerbils, chipmunks, rats, mice, other small rodents, rabbits and hares rarely require post-exposure rabies prophylaxis unless the behaviour of the biting animal was highly unusual (12).

d Public Health/Nursing Station should advise exposed person to obtain assistance from local animal control services in searching for the animal (in Winnipeg: call Animal Services 204-986-2155 or 311; outside Winnipeg call 1-877-311-4974; after hours use Police Dispatch 204-986-6222).

e The nearest CFIA office (www.inspection.gc.ca/english/anima/heasan/offbure.shtml) should be consulted for direction on specimen collection, transport and testing. In remote areas, where the CFIA is not present, special arrangements have been made with the local authorities to collect the sample from rabies suspect animals which came into contact with humans or domestic animals.

f If bat exposure is uncertain, RPEP can be delayed if bat is available for testing; however, RPEP should never be delayed beyond 48 hours while waiting for bat testing results (21).

g In 1999, 2 woodchucks (groundhogs) were found to be rabid in Manitoba.

Refer to Appendix D: Human Rabies Prevention Risk Assessment Algorithm.

Instructions for RPEP Administration:

General:

- Rabies PEP should always include RabIg and rabies vaccine (HDCV or PCECV) except for previously immunized individuals (refer to Section 8.34 for these individuals).
- When indicated (refer to Table 1 and Appendix D), RPEP should be started after the exposure and should be offered to exposed individuals regardless of the elapsed interval (5, 23).
- It should be emphasized to RPEP recipients that the current treatment only protects them against the most recent exposure and does not provide lifelong immunity. Any subsequent exposures will require evaluation to determine if another course of RPEP is warranted (20).
- As rabies is a fatal disease, any contraindication to vaccine should be carefully re-considered before withholding post-exposure immunization (2005 NACI statement).

RabIg:

- The recommended dose of RabIg is 20 IU/Kg body weight for all age groups including children (5).
- The full dose of RabIg should be infiltrated into the wound and surrounding area if anatomically feasible (5, 20). Any remaining RabIg should be administered intramuscularly using a separate needle and syringe at a site distant to that of vaccine administration (5, 21).
- When more than one wound exists, each should be infiltrated with a portion of the RabIg (diluted 2 to 3 fold in 0.9% sodium chloride if necessary) given in separate syringes (5).
- If the site of the wound is unknown, the entire dose should be administered intramuscularly (5, 21).
- Because of interference with antibody production, no more than the recommended dose of RabIg should be given (5).
- If RabIg is not administered on day 0 of the RPEP regimen, it can be administered up to eight days after initiating an approved vaccine course (5). Since vaccine-induced antibodies begin to appear within one week, there is no value in administering RabIg more than eight days after initiating an approved vaccine course (5).

Rabies Vaccine (HDCV or PCECV):

- Immunocompetent individuals should receive a four-dose rabies vaccine series given on days 0, 3, 7 and 14 (4). Immunocompromised individuals should receive a five-dose rabies vaccine series given on days 0, 3, 7, 14 and 28 (4).
- All doses of HDCV or PCECV should be given intramuscularly (4). All intramuscular injections must be given into the deltoid region or, in small children, into the anterolateral area of the thigh muscle (24). Vaccine should never be administered in the gluteal region (23, 24). **Under no circumstances should the first dose of vaccine be administered in the same syringe or at the same site as RabIg** (5).
- Subsequent doses of vaccine can be administered in the same anatomic location in which RabIg was administered (4). If a dose is delayed, the subsequent doses should be adjusted accordingly to maintain the recommended dosage interval.
- Immunosuppressive agents should not be administered during RPEP unless essential for the treatment of other conditions (4).
- Post-immunization testing (7-14 days after administration of the final dose in the series) should be considered for the following individuals:
  - Immunocompromised (due to illness, medication, advanced age) (5).
  - Where substantial deviations from the recommended RPEP schedule have occurred (e.g., fewer than the recommended number of doses, altered interval between doses or route of administration) (12).

8.34 Rabies Post-exposure Prophylaxis for Previously Immunized Individuals

- Individuals meeting the criteria[h] for prior immunization should receive two doses of HDCV or PCEVC, one injected immediately and the other three days later, without RabIg (5).
- Individuals who received rabies vaccine in the past but do **not** meet the criteria[h] and all immunocompromised individuals regardless of immunization history will require a complete course of HDCV or PCECV plus RabIg as described above in Section 8.33. A serum sample may be collected before vaccine is given, and if an acceptable antibody level (≥ 0.5 IU/mL) is demonstrated, the course may be discontinued, provided at least two doses of vaccine have been given. If in doubt, consultation with an infectious diseases or public health physician is recommended (5).

8.35 Rabies Post-exposure Prophylaxis for Travelers Exposed in Another Country Where RPEP was Started

If the rabies vaccine schedule was initiated in another country where cold-chain integrity and hence vaccine efficacy cannot be definitively confirmed, consultation with an MOH is necessary. If it can be confirmed that an efficacious vaccine was used in a reputable clinic with maintenance of the cold-chain, then it may be appropriate to continue the vaccine schedule rather than starting from the beginning (refer to CATMAT rabies statement for list of rabies vaccines that meet WHO safety and efficacy requirements, available at: http://www.phac-aspc.gc.ca/tmp-pmv/catmat-ccmtmv/index-eng.php). Ifit cannot be confirmed that an efficacious vaccine was used, and if timely rabies antibody levels cannot be determined, it would be advisable to restart the vaccine schedule from Day 0.

8.36 Policy for Follow-up of Exposures that Cross Jurisdictional Boundaries

Situations where more than one jurisdiction could be involved in the follow-up of animal exposures include:

- The exposed person lives in a community served by one Regional Health Authority (RHA) but the exposure occurred in a community served by another.
- The exposed person lives and was exposed in a community served by one RHA but seeks initial medical care in a community served by another.
- The exposed person lives in a First Nations community but seeks initial care in a RHA.

Policy:

- **Jurisdiction of *current address* of exposed person (including persons exposed out-of-province or out-of-country) has ultimate responsibility for appropriate public health investigation and follow-up.** *Current address* is defined as where the person is living during the exposure follow-up period (normally between 0-38 days after exposure depending on whether prophylaxis is begun immediately, after a 10-day observation period or not at all and whether person is immunocompromised).
- **Animal exposure occurs in a different jurisdiction from *current address* (e.g., person bitten outside province, then comes home).** The jurisdiction of *current address* must contact the jurisdiction (or other province, country) where the exposure took place and notify it that animal exposure follow-up is required. The jurisdiction where the exposure took place must report the required follow-up information back to the jurisdiction of *current address*.

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h Completion of an approved course of pre- or postexposure prophylaxis with HDCV or PCECV; or completion of an unapproved schedule (i.e., immunization with another type of rabies vaccine or unapproved HDCV or PCECV series) as long as a neutralizing rabies antibody of ≥ 0.5 IU/mL is demonstrated. This test is a surrogate for adequate immune response to vaccination (4). Serology specimens should be sent to CPL for testing.

- **Responsibility when exposed person moves to a different jurisdiction during follow-up period.** It is the responsibility of the exposed person to alert health care providers of any move to a different jurisdiction during the follow-up period. The jurisdiction of *current address* that began follow-up must alert the jurisdiction (including another province or country) that the person moved to of the type of follow-up required.
- **Referral of animal exposure when follow-up period is unclear.** When hospitals, clinics and Health Links-Info Santé refer animal exposures for public health investigation and follow-up, the duration of the follow-up period may not always be obvious. In this case, *current address* is defined based on location in the first 10 days following exposure.

8.4 Preventive Measures

8.41 Immunization

- Pre-exposure immunization and serological monitoring of individuals with occupations placing them at high risk of exposure to rabies as per the current *Canadian Immunization Guide* recommendations. Refer to the current Manitoba Health eligibility criteria available at: http://www.gov.mb.ca/health/publichealth/cdc/vaccineeligibility.html . High-risk persons (except travelers) residing in Winnipeg or in close proximity may make arrangements to participate in the intradermal immunization program by calling 204-789-3364. High-risk persons residing outside Winnipeg should contact their health care provider or local public health nurse to be immunized via the intramuscular route.
- Individuals not meeting the eligibility criteria for publicly-funded vaccine but who may be at higher risk of contact with rabid animals through recreational activities (e.g., spelunkers, hunters, trappers) should consult their health care provider.
- Travelers to endemic areas where there is poor access to adequate and safe post-exposure management should consult travel health clinics for appropriate vaccination recommendations (5). The cost of rabies pre-exposure immunization for travel purposes is not covered by Manitoba Health.
- Rabies post-exposure prophylaxis in individuals sustaining exposures to known or suspected rabid humans or animals.

8.42 Education

- Public awareness of the risk of rabies exposure through contact with a variety of animals (e.g., skunks, bats) (16).
- Informing the public on what to do if exposed to a possibly rabid animal.

8.43 Animal Management

- Register, license and immunize all dogs when feasible in enzootic countries (3).
- Immunize all cats and ferrets.
- Sterilize pets.
- Keep pets under control (e.g., leashed), especially in unfamiliar territory or where they are more likely to encounter other domestic or wild animals.
- Identify and cover potential entrances (e.g., chimneys) for wildlife, including bats (7).
- Fill electrical and plumbing holes with stainless steel wool or caulking (21).
- Consult with animal control or wildlife professional if bats are roosting in a home (13, 21).
- Avoid contact with wild or stray animals and warn young children against such contact (20).
- Avoid and do not handle sick or strange-acting domestic and wild animals (3).
- Do not keep wild animals as pets.
- Report any strange-acting animals as well as dead animals found on residential property to the local public health unit or animal control office (20).

- Report any animal that has bitten a human and/or is suspected of being rabid to the local Medical Officer of Health and the nearest CFIA veterinarian for confinement and observation (5). The CFIA investigates all rabies suspect cases in domestic animals.
- Wear protective gloves and use shovels when removing dead animals from property (20). Information on dead animal removal is available at: www.gov.mb.ca/health/wnv/docs/disposing.pdf .
- Euthanize wild animals that have bitten a person and examine the brain for evidence of rabies (3).
- Quarantine all domestic animals suspected of being exposed to a confirmed or suspected rabid domestic or wild animal. CFIA veterinarians quarantine any domestic animal that is known or suspected to have had contact with a rabid animal.
- Immunize free-ranging wild carnivores via the distribution of vaccine-laden bait (3, 25).
- Prompt management of rabies outbreaks in animals.

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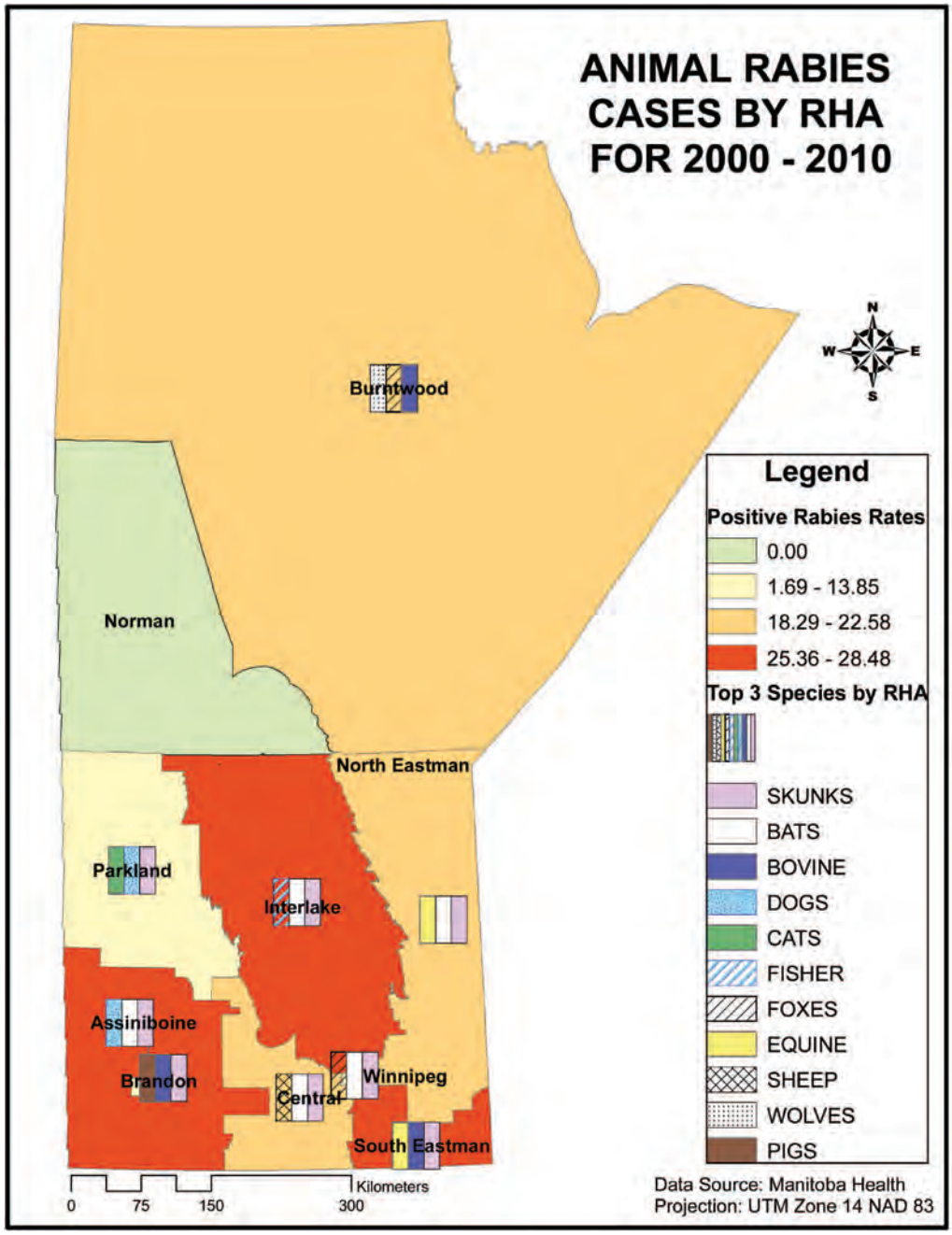
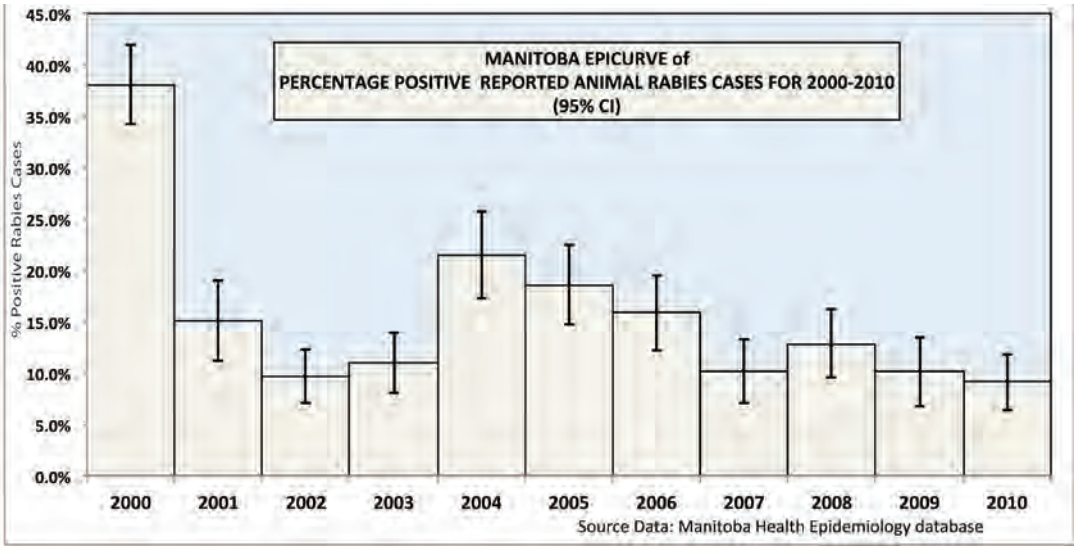
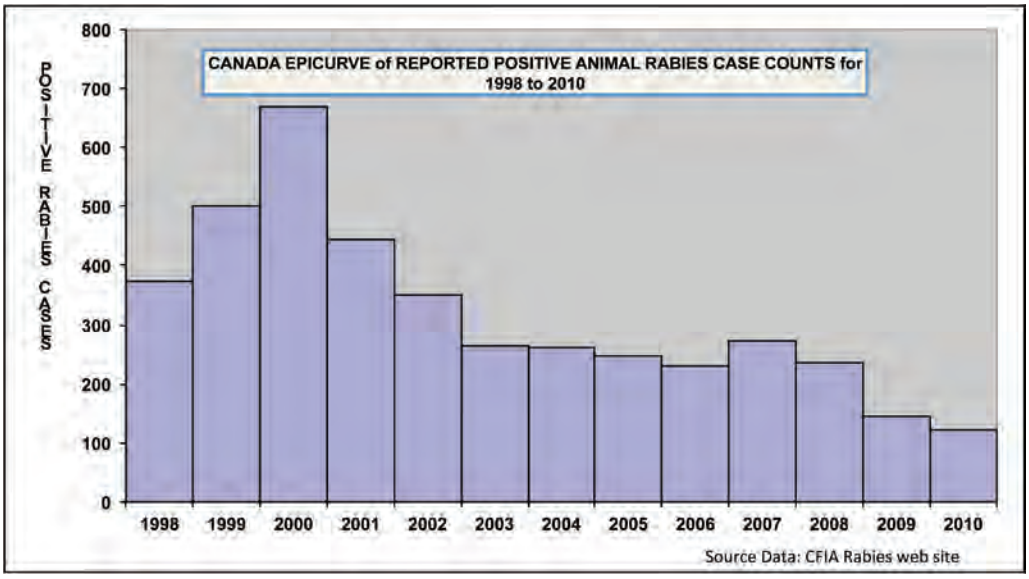
Appendix A: Epidemiology of Rabies in Animals

Note: The CFIA data does not supply total test counts (i.e., both negative and positive results) so there is no correlation available to determine if the rates are changing over time in relation to what the graph would indicate. The Manitoba data is from a database that cannot be validated back further than three years and has not been analyzed before, thus there are no previous reports to compare it to. Prospective data collection will be considered more accurate.




MANITOBA EPICURVE of
PERCENTAGE POSITIVE REPORTED ANIMAL RABIES CASES FOR 2000-2010
(95% CI)
% Positive Rabies Cases
45.0%
40.0%
35.0%
30.0%
25.0%
20.0%
15.0%
10.0%
5.0%
0.0%
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
Source Data: Manitoba Health Epidemiology database


CANADA EPICURVE of REPORTED POSITIVE ANIMAL RABIES CASE COUNTS for
1998 to 2010
POSITIVE RABIES CASES
800
700
600
500
400
300
200
100
0
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
Source Data: CFIA Rabies web site

Total Case Counts for Animals Submitted for Rabies Testing in Manitoba for 2000-2010 (by Animal)
(Source: Manitoba Health Public Health Database)

MANITOBA ANIMALS	Total Case Count	Percent of Total	95% CI	Negative Cases	Positive Cases	Percent Positive	95% CI
Skunks	722	15.3%	(14.3-16.4)	127	595	82.4%	(79.6-85.2)
Fisher	3	0.1%	(0-0.2)	1	2	66.7%	(13.3-120)
Foxes	35	0.7%	(0.5-1)	23	12	34.3%	(18.6-50)
Wolves	6	0.1%	(0.1-0.3)	4	2	33.3%	(-4.4-71.1)
Bats	84	1.8%	(1.4-2.2)	70	14	16.7%	(8.7-24.6)
Bears	6	0.1%	(0.1-0.3)	5	1	16.7%	(-13.2-46.5)
Bovine	522	11.1%	(10.2-12)	458	64	12.3%	(9.4-15.1)
Ovine	10	0.2%	(0.1-0.4)	9	1	10.0%	(-8.6-28.6)
Equine	215	4.6%	(4-5.2)	201	14	6.5%	(3.2-9.8)
Coyotes	25	0.5%	(0.4-0.8)	24	1	4.0%	(-3.7-11.7)
Dogs	1,377	29.2%	(27.9-30.5)	1,348	29	2.1%	(1.3-2.9)
Raccoons	97	2.1%	(1.7-2.5)	95	2	2.1%	(-0.8-4.9)
Cats	1,419	30.1%	(28.8-31.4)	1,398	21	1.5%	(0.9-2.1)
Other	145	3.1%	(2.6-3.6)	144	1	0.7%	(-0.7-2)
Caprine	22	0.5%	(0.3-0.7)	22	0	0.0%	(0-0)
Antelopes	11	0.2%	(0.1-0.4)	11	0	0.0%	(0-0)
Woodchuck / Ground Hogs	8	0.2%	(0.1-0.3)	8	0	0.0%	(0-0)
Bison	2	0.0%	(0-0.2)	2	0	0.0%	(0-0)
Hamster	2	0.0%	(0-0.2)	2	0	0.0%	(0-0)
Lynx	1	0.0%	(0-0.1)	1	0	0.0%	(0-0)
Porcine	1	0.0%	(0-0.1)	1	0	0.0%	(0-0)

Total Case Counts for Animals Submitted for Rabies Testing in Manitoba for 2000-2010 (by Region)
(Source: Manitoba Health Public Health Database)

REGIONS	Total Case Count	Percent of Total	95% CI	Negative	Positive Cases	Percent Positive Cases	95% CI Positive
Churchill	21	0.4%	(0.3-0.6)	9	12	57.1%	(36-78.3)
Interlake	653	13.9%	(12.9-14.8)	467	186	28.5%	(25-31.9)
South Eastman	358	7.6%	(6.8-8.4)	258	100	27.9%	(23.3-32.6)
Assiniboine	895	19.0%	(17.9-20.1)	668	227	25.4%	(22.5-28.2)
North Eastman	217	4.6%	(4-5.2)	168	49	22.6%	(17-28.1)
Central	494	10.5%	(9.6-11.4)	387	107	21.7%	(18-25.3)
Parkland	260	5.5%	(4.9-6.2)	224	36	13.8%	(9.6-18)
Brandon	124	2.6%	(2.2-3.1)	112	12	9.7%	(4.5-14.9)
Burntwood	61	1.3%	(1-1.6)	58	3	4.9%	(-0.5-10.3)
Winnipeg	1,600	33.9%	(32.6-35.3)	1,573	27	1.7%	(1.1-2.3)
Nor-Man	30	0.6%	(0.4-0.9)	30	0	0.0%	(0-0)

Total Case Counts for Animals Submitted for Rabies Testing in Canada for 1998-2010 (by Animal)
(Source: CFIA Rabies Web page)

CANADA ANIMALS	Total Case Count	Percent of Total	95% CI
Skunks	1,892	45.5%	(43.9-47)
Bats	1,018	24.5%	(23.2-25.8)
Foxes	368	8.9%	(8-9.8)
Raccoons	291	7.0%	(6.3-7.8)
Bovine	267	6.5%	(5.7-7.2)
Dogs	137	3.3%	(2.8-3.9)
Cats	65	1.5%	(1.2-1.9)
Equine	55	1.3%	(1-1.7)
Wolves	24	0.6%	(0.3-0.8)
Ovine	14	0.3%	(0.2-0.5)
Caprine	5	0.1%	(0-0.2)
Coyotes	4	0.1%	(0-0.2)
Fisher	3	0.1%	(0-0.2)
Porcine	3	0.1%	(0-0.2)
Bears	3	0.0%	(0-0.1)
Bison	2	0.0%	(0-0.1)
Hamster	1	0.0%	(0-0.1)
Lynx	1	0.0%	(0-0.1)
Antelopes	1	0.0%	(0-0)
Other	2	0.0%	(0-0)
Woodchuck / Ground Hogs	3	0.0%	(0-0)

Total Case Counts for Animals Submitted for Rabies Testing in Canada for 1998-2010 (by Province)
(Source: CFIA Rabies Web page)

PROVINCE	Total Case Count	Percent of Total	95% CI
Ont.	1,498	36.0%	(34.6-37.5)
Man.	1,176	28.3%	(26.9-29.6)
Sask.	673	16.2%	(15.1-17.3)
QC.	306	7.4%	(6.6-8.2)
B.C.	177	4.3%	(3.6-4.9)
N.W.T./ NU.	164	3.9%	(3.4-4.5)
N.B.	72	1.7%	(1.3-2.1)
N.L.	44	1.1%	(0.7-1.4)
Alb.	41	1.0%	(0.7-1.3)
N.S.	6	0.1%	(0-0.3)
P.E.I.	2	0.0%	(0-0.1)
Yukon	0	0.0%	(0-0)

Appendix B: 10 Day Animal Observation

In the City of Winnipeg, Animal Services may be willing to manage the animal observation period. The owner of the animal would be charged a fee for the provision of this service.

Purpose: to cover the timeframe that the possible rabies infected animal would be infectious to humans (period of communicability).

When to Initiate: Initiating a 10 day observation period of a cat or dog or a ferret before making a decision on post-exposure prophylaxis is appropriate when:

- the bite victim (or family) is confident that the owners will notify them or a veterinarian immediately, if a significant change in health or behaviour of the animal occurs during this period.

Procedure: Healthy dogs, cats and ferrets will normally be confined to immediate premises (in a manner that will not allow for further exposures to occur) and observed for behaviour changes by a responsible owner for 10 days. If this option is not feasible, alternate arrangements will be made.

- If the animal does not die, appear clinically ill or display a significant change in behaviour during this period it can be concluded that the animal was not shedding rabies virus at the time of the exposure and was therefore non-infectious (3). No further public health follow-up is required.
- If the animal does display a significant change in behaviour or signs of illness suggestive of rabies or dies during the observation period, the Regional Health Authority/First Nations Inuit Health must report the incident to the Canadian Food Inspection Agency (CFIA). Refer to Sections 2.2 and 8.31 for reporting instructions. If warranted, the CFIA veterinarian will arrange collection and shipping of appropriate animal specimens to the CFIA laboratory.

Note: The observation period for an animal that has bitten a human is **not** the same as the animal quarantine period. The animal quarantine period refers to the length of time that a domestic animal/pet is isolated after it has been bitten by an animal suspected of being infectious for rabies. This period is longer (up to six months) and is managed by the CFIA.

Appendix C: Provoked and Unprovoked Animal Attacks

The following table can be used to distinguish provoked from unprovoked attacks in dogs; some situations may be extended to other domestic animals (e.g., beating any animal, stepping on a cat). Unprovoked dog attacks are more suggestive of rabies than provoked attacks especially where rabies is endemic. Unprovoked attacks are typically characterized by an animal crossing neutral space to attack the person. However, rabid cats and dogs may become depressed and try to hide in isolated places (26).

Provoked Attack	Unprovoked Attack
1. Entering an unfamiliar compound with a guard dog.	1. Attack by a dog for an unknown reason and from an unknown site (neutral territory).
2. Walking past a dog.	2. Being bitten by the victim's own dog that has no prior history of dominance aggression.
3. Stepping on or bumping into a dog.	
4. Interfering in a dog fight.	
5. Taking puppies from their mother.	
6. Taking food from a dog.	
7. Playing in an area where a dog is located.	
8. Handling/surprising a dog while it is sleeping.	
9. Beating a dog.	
10. Petting or playing with a strange dog.	
11. In general, attempting to feed or handle an apparently healthy domestic animal that a person is not familiar with (3, 14).	

Appendix D: Human Rabies Prevention Risk Assessment Algorithm