Guidance Document for the Management of Suspected Rabies Exposures

This document is in support of the *Rabies Prevention and Control Protocol, 2008* (or as current) under the Ontario Public Health Standards.

Infectious Disease Policy and Programs Unit
Public Health Policy and Programs Branch
Public Health Division
Ministry of Health and Long-Term Care

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Table of Contents

1. Introduction

The Ontario Public Health Standards (OPHS)[1] specify the minimum public health programs and services that all boards of health are required to provide. The OPHS are published by the Minister of Health and Long-Term Care under section 7 of the *Health Protection and Promotion Act* (HPPA)[2]. In addition, all suspected incidents of a potential rabies exposure must be reported to the local medical officer of health [HPPA, Reg. 557, s. 2 (1)] who can provide consultation and the necessary biologicals.[3]

The OPHS are supported by incorporated protocols that further delineate expectations for carrying out the standards' requirements. The *Rabies Prevention and Control Protocol, 2008* (or as current)[4] is part of the Rabies Prevention and Control Program Standard. The purpose of the *Rabies Prevention and Control Protocol, 2008* (or as current) is to prevent a human case of rabies by standardizing animal rabies surveillance and the management of human rabies exposures.[4]

This guidance document was created to assist professional staff employed by local boards of health with the management of suspected rabies exposures. The document is a condensed version of the 'Rabies Vaccine' chapter in the *Canadian Immunization Guide*.[5] Text in italics has been added or substituted by the Ministry of Health and Long-Term Care. Please note that this document ONLY summarizes post-exposure prophylaxis (PEP) guidelines. For information about pre-exposure management and vaccination of high-risk occupational categories, please see the relevant chapter in the *Canadian Immunization Guide*.[5] This document replaces the *Guidelines for Management of Suspected Rabies Exposures* (Ministry of Health and Long-Term Care, January 2010).

The introductory paragraph of the 'Operational Roles and Responsibilities' section of the *Rabies Prevention and Control Protocol, 2013* requires boards of health to follow the protocol in accordance with the Rabies Vaccine Chapter of the *Canadian Immunization Guide*[5] and this Guidance Document. This guidance document is intended to be used to assist professional staff employed by local boards of health as they plan and execute their responsibilities under the HPPA[2] and the OPHS.[1]

1.1 Disclaimer

This guidance document is not intended to provide legal advice or to be a substitute for the professional judgement of staff employed by local boards of health or legal counsel. Professional staff employed by local boards of health should consult with their manager and/or legal counsel, as appropriate. Where there is conflict between this guidance document and the *Rabies Prevention and Control Protocol*, the OPHS, the HPPA or its regulations, the *Rabies Prevention and Control Protocol*, OPHS, HPPA or its regulations, as the case may be, shall prevail.

2. Post-Exposure Management

2.1 Species of Animal

The animals in Canada most often proven rabid are wild terrestrial carnivores (e.g., skunks, foxes and raccoons), bats, cattle and stray dogs and cats. If the incident involved a dog or cat, determining if it is a stray or domestic animal assists with the risk assessment. Generally, rabies is less likely in domestic animals, particularly domestic dogs, compared to stray animals due to the following factors: domestic animals are more likely to be vaccinated; domestic animals may spend less time outdoors where exposure to a potentially rabid animal could occur; and an encounter with a potentially rabid animal is more likely to be recognized in a domestic animal.

Human exposures to livestock are usually confined to salivary contamination, with the exception of horses and swine, from which bites have been reported. The risk of infection after exposure to rabid cattle is low.

Squirrels, hamsters, guinea-pigs, gerbils, chipmunks, rats, mice or other small rodents, as well as lagomorphs (such as rabbits and hares) are only rarely found to be infected with rabies because it is believed that they are likely to be killed by the larger animal that could have potentially transmitted rabies to them. These small animals can become infected by bat strains of rabies; however, no cases of transmission of bat strains of rabies from these animals to humans have been documented. Because these small animals are not known to have caused human rabies in North America, PEP should be considered only if the animal's behaviour was highly unusual. For example, a bite from a squirrel while feeding it would not be considered unusual behaviour and so does not warrant PEP based on this information alone.

Larger rodents, such as groundhogs, woodchucks and beavers, can potentially carry rabies, although this is rare in Canada. Exposure to these animals requires an assessment of the circumstances of the exposure to determine the need for PEP, including the frequency of rabies in these animals in the geographic area, the frequency of rabies in other animals, the type of exposure, and the circumstances of the bite, including whether it was provoked or unprovoked.

2.2 Type of Exposure

Rabies is transmitted only when the virus is introduced into a bite wound, open cuts in skin, or onto mucous membranes such as the mouth or eyes. Three broad categories of exposure are recognized as warranting PEP: bite, non-bite and bat exposures.

Bite exposures: Transmission of rabies occurs most commonly through bites. A bite is defined as any penetration of the skin by teeth.

Non-bite exposures: This category includes contamination of scratches, abrasions or cuts of the skin or mucous membranes by saliva or other potentially infectious material, such as the brain tissue of a rabid animal. Non-bite exposures, other than organ or tissue transplants, have almost never been proven to cause rabies, and PEP is not indicated unless the non-bite exposure involves saliva or neural tissue being introduced into fresh,

open cuts or scratches in skin or onto mucous membranes. These exposures require a risk assessment that considers the likelihood of salivary contamination.

Petting a rabid animal or handling its blood, urine or feces is not considered to be an exposure; however, such contact should be avoided. Being sprayed by a skunk is also not considered an exposure. These incidents do not warrant PEP.

Post-exposure prophylaxis is recommended in rare instances of non-bite exposure, such as inhalation of aerosolized virus by spelunkers exploring caves inhabited by infected bats or by laboratory technicians homogenizing tissues infected with rabies virus without appropriate precautions; however, the efficacy of prophylaxis after such exposures is unknown.

Exposures incurred in the course of caring for humans with rabies could theoretically transmit the infection. No case of rabies acquired in this way has been documented, but PEP should be considered for exposed individuals.

Bat exposures: Post-exposure rabies prophylaxis following bat contact is recommended when **both** the following conditions apply:

- There has been direct contact with a bat; **AND**
- A bite, scratch, or saliva exposure into a wound or mucous membrane cannot be ruled out.

Direct contact with a bat is defined as the bat touching or landing on a person. When there is no direct contact with a bat, the risk of rabies is extremely rare and rabies PEP is not recommended.

In an adult, a bat landing on clothing would be considered reason for PEP administration only if a bite, scratch, or saliva exposure into a wound or mucous membrane could not be ruled out. *Therefore, if a bat lands on the clothing of a person who can be sure that a bite or scratch did not occur and that the bat's saliva did not contact an open wound or mucous membranes, then PEP is not required.*

In a child, any direct contact with a bat (*i.e., the bat landing on or touching the child,* including contact through clothes) could be considered a reason for PEP administration, as a history to rule out a bite, scratch or mucous membrane exposure may not be reliable.

When a bat is found in the room with a child or adult who is unable to give a reliable history, assessment of direct contact can be difficult. Factors indicating that direct contact may have occurred in these situations include the individual waking up crying or upset while the bat was in the room, or observation of an obvious bite or scratch mark.

If there has been no direct contact with the bat, the bat should not be captured for testing and should be safely let out of the house. To remove a bat from the house, the area with the bat should be closed off from the rest of the house and people and pets kept out of the area. The doors or windows in the area with the bat should be opened to the exterior to let the bat escape.

If there has been direct contact with a bat, a trained wildlife or animal control worker should be contacted to attempt to capture the bat. The worker should use extreme caution to ensure that there is no further exposure to the bat. They should wear thick leather

gloves, avoid touching the bat, and place the intact bat in a closed secure container. Once the bat has been captured, local public health officials should be contacted. The public health department will contact the Canadian Food Inspection Agency (CFIA) regarding rabies testing of the bat and the CFIA will follow-up any domestic animal that may have had exposure to the bat, should the bat test positive. Bats should be submitted intact for rabies testing.

Please note that spelunker exposure in caves will require special consideration, as explained above, under ***Non-bite exposures****.*

2.3 Investigation of the Incident

Each incident of possible exposure requires a full investigation. This should include an assessment of the risk of rabies in the animal species involved (including vaccination status, history of potential exposure to other animals of unknown rabies vaccination status, and travel history) and the behaviour of the particular domestic animal implicated.

Any animal that has bitten a human or is suspected of being rabid should be reported to local public health officials. The CFIA district veterinarian *and the ministry's public health veterinarian* should be notified of any animal suspected of being rabid, regardless of whether it has been involved in a biting incident. CFIA veterinarians are familiar with the regulations concerning rabies and, if necessary, will collect and ship appropriate specimens to a federal laboratory for diagnosis.

When the rabies virus is inoculated into a wound, it must be taken up at a nerve synapse to travel to the brain, where it causes fatal encephalitis. The virus may enter a nerve rapidly or it may remain at the site of the bite for an extended period before gaining access to the nervous system. More severe bites may be more likely to suggest the animal is rabid and these bites may also provide more opportunity for transmission of the virus because of the extent of exposure to saliva.

A higher density of nerve endings in the region of the bite increases the risk of developing rabies encephalitis. Bites on the hands and face are considered higher-risk exposures because of the density of nerve endings. *Bites to the face and neck are also considered higher-risk exposures because of the proximity to cranial nerves leading directly into the brain.*

A history of abnormal or aggressive behaviour in a domestic animal, potential for exposure of a domestic animal to other animals that could transmit rabies (*including other domestic animals of unknown rabies vaccination status*), and a previous encounter of a domestic animal with a wild animal should be considered when determining the likelihood that a domestic animal exposure carries a risk of rabies transmission.

An unprovoked attack is more likely to indicate that the animal is rabid. Nevertheless, rabid animals may become uncharacteristically quiet. Bites inflicted on a person attempting to feed or handle an apparently healthy animal should generally be regarded as provoked. Untrained individuals should never handle wild or stray animals or any domestic animal that is behaving unusually and children should be taught this precaution.

Domestic pets with up-to-date rabies vaccination are unlikely to become infected with rabies. A veterinarian should be consulted to determine if the animal is up-to-date with its vaccinations. Any domestic dog, cat, or ferret (regardless of vaccination history) that has bitten a human should be reported to public health officials for appropriate follow-up.

Dogs, cats and ferrets that are apparently healthy should be confined and observed for 10 days after a bite, regardless of the animal's rabies vaccination status. Animals that are alive and healthy at the end of the 10-day period would not have transmitted rabies in their saliva at the time of the bite. If illness suggestive of rabies exists at the time of the bite or develops during the observation period, the animal should be humanely euthanized in a way that does as little damage to the brain as possible, and the head submitted for laboratory examination and rabies testing. Rabies virus is readily demonstrable in brains of animals with neurologic symptoms. The CFIA veterinarian should be contacted to assist with determining the need for testing, organizing the testing and following-up potential exposures to other domestic animals.

The confinement and observation of an apparently healthy dog, cat or ferret can take place at the owner's home, an animal shelter, or a veterinarian's office, depending on circumstances including the reliability of the owner, the capacity to keep the animal away from people and other animals, and the suspicion of rabies in the animal. The person responsible for observation of the animal should be advised to notify public health officials if the animal becomes ill or escapes during the observation period. The animal should be observed by a public health official or veterinarian at the end of the 10-day observation period to ensure it is alive and healthy. Unvaccinated animals that remain healthy should be vaccinated at the end of the observation period.

Stray or unwanted dogs, cats or ferrets involved in an exposure that could potentially transmit rabies should be confined and observed as outlined above. If this is not possible, the animal should be humanely euthanized in a way that does as little damage to the brain as possible, and the head submitted for laboratory examination and rabies testing in consultation with the local CFIA veterinarian.

If the dog, cat or ferret has escaped, attempts should be made to find the animal and owner. If the dog, cat or ferret cannot be located, a decision should be made in consultation with public health officials regarding the need for PEP.

Generally, behaviour in wild animals cannot be accurately evaluated and should not be considered part of the risk assessment; however, some behaviour in bats may be considered abnormal and indicative of rabies, such as a bat attacking a person or hanging on tenaciously to a person.

The period of rabies virus shedding in a wild terrestrial carnivore (such as a skunk, fox or raccoon) is unknown. Therefore, when these animals are involved in an exposure that could potentially transmit rabies, a trained wildlife or animal control worker should be contacted to capture the animal. The worker should use extreme caution to ensure that there is no further exposure to the animal. The animal should be immediately humanely euthanized in a way that does as little damage to the brain as possible, and the head submitted for laboratory examination and rabies testing in consultation with the local CFIA veterinarian.

The history obtained from a child who has been potentially exposed to an animal can be difficult to interpret and potentially unreliable. This should be considered when determining the appropriate post-exposure management.

3. Management of People after Possible Exposure to Rabies

The objective of post-exposure management is to neutralize the rabies virus at the site of infection before the virus can enter the central nervous system. Immediate and thorough cleaning and flushing of the wound with soap and water is imperative and is probably the most effective procedure in the prevention of rabies. Care should be taken to clean the wound to its depth. Flushing for approximately 15 minutes is suggested. Some guidelines also suggest the application of a viricidal agent such as iodine-containing or alcohol solutions. Suturing the wound should be avoided if possible, and tetanus prophylaxis and antibiotics should be given as appropriate.

If exposure to rabies is considered highly likely, PEP should be started as soon as possible after the exposure. In other circumstances, if the initiation of PEP is delayed until test results from the involved animal are available, a maximum waiting period of 48 hours is recommended. In consultation with public health officials, the post-exposure vaccine series may be discontinued if appropriate laboratory testing of the involved animal is negative. If indicated based on the risk assessment, PEP should be offered to exposed individuals regardless of the time interval after exposure.

Post-exposure prophylaxis should begin immediately following exposure to a wild terrestrial carnivore (such as a fox, skunk or raccoon) in enzootic areas unless the animal is available for rabies testing and rabies is not considered likely. Initiation of PEP should not be delayed beyond 48 hours while waiting for laboratory tests if the exposure is from a terrestrial animal in an enzootic area. If PEP is started before the test results are available, in consultation with public health officials, the rabies vaccine may be discontinued if the animal tests negative for rabies.

When there is a known bat bite, scratch or saliva exposure into a wound or mucous membrane, rabies PEP should be initiated immediately because of the higher prevalence of rabies in bats. This is particularly important when the exposure involves the face, neck or hands, or when the behaviour of the bat is clearly abnormal, such as if the bat has attacked the person or hangs on tenaciously. If the bat is available for testing, PEP may be discontinued after consultation with public health officials if the bat tests negative for rabies.

If someone is touched by a bat (such as a bat in flight) and the bat is available for rabies testing, the health care provider may decide to delay PEP. PEP should not be delayed more than 48 hours. If a bat tests positive for rabies, the need for PEP should depend on whether direct contact with the bat occurred and not the rabies status of the bat. If someone is touched by a bat *and a bite, scratch or saliva exposure into a wound or mucous membrane cannot be ruled out*, but the bat is not available for testing it should be considered a direct contact and PEP given.

Table 1 outlines recommendations for the management of people after possible exposure to rabies. **These recommendations are intended as a guide and may need to be modified in accordance with the specific circumstances of the exposure.**

Table 1: Summary of Post-Exposure Prophylaxis (PEP) for Persons Potentially Exposed to Rabies

Animal species	Condition of Animal at Time of Exposure	Management of Exposed Persons not Previously Immunized against Rabies	Management of Exposed Persons Previously Immunized against Rabies
Dog, cat or ferret	Healthy and available for a 10 day observation period	1. Local treatment of wound 2. At first indication of rabies in animal, give RabIg and begin four or five doses of HDCV or PCECV 3. At first indication of rabies in the animal, arrange to have the animal tested for rabies	1. Local treatment of wound 2. At first indication of rabies in animal, begin two doses of HDCV or PCECV 3. At first indication of rabies in the animal, arrange to have the animal tested for rabies
	Unknown or escaped	1. Local treatment of wound 2. Consult public health officials for risk assessment	1. Local treatment of wound 2. Consult public health officials for risk assessment
	Rabid or suspected to be rabid*	1. Local treatment of wound 2. Give RabIg and begin four or five doses of HDCV or PCECV 3. Arrange to have animal tested for rabies, if available	1. Local treatment of wound 2. Begin two doses of HDCV or PCECV 3. Arrange to have animal tested for rabies, if available
Skunk, bat, fox, coyote, raccoon and other carnivores.	Regard as rabid[i] unless geographic area is known to be rabies free	1. Local treatment of wound 2. Post-exposure prophylaxis with RabIg and four or five doses of HDCV or PCECV should begin immediately. If animal is available for rabies testing, in some instances PEP may be delayed for no more than 48 hours while awaiting results. 3. Arrange to have animal tested for rabies, if available	1. Local treatment of wound 2. Post-exposure prophylaxis with two doses of HDCV or PCECV should begin immediately. If animal is available for rabies testing, in some instances PEP may be delayed for no more than 48 hours while awaiting results 3. Arrange to have animal tested for rabies, if available
Livestock, rodents or lagomorphs (hares and rabbits)	Consider individually. Consult appropriate public health and CFIA officials. Bites of squirrels, chipmunks, rats, mice, hamsters, gerbils, guinea pigs, other small rodents, rabbits and hares would only warrant post-exposure rabies prophylaxis if the behaviour of the biting animal was highly unusual. Bites from larger rodents (e.g., groundhogs, woodchucks, beavers) require a risk assessment.		

RabIg = human rabies immune globulin, HDCV = human diploid cell vaccine, PCECV = purified chick embryo cell culture vaccine.

4. Schedule and Dosage

4.1 Post-Exposure Prophylaxis (PEP) of Previously Unimmunized Individuals

* If possible, the animal should be humanely killed and the brain tested for rabies as soon as possible; holding for observation is not recommended. Discontinue vaccine if rabies testing of the involved animal is negative.

Post-exposure prophylaxis of previously unimmunized individuals should consist of both Rabies Immune Globulin (RabIg) and rabies vaccine. The RabIg provides immediate passive protection until the exposed person mounts an immune response to the rabies vaccine.

4.1.1 Rabies Immune Globulin (RabIg)

The recommended dose of RabIg is 20 IU/kg body weight for all age groups, including children, given on the first day of initiation of therapy (day 0). Because of possible interference of RabIg with the immune response to the rabies vaccine, the dose of RabIg should not be exceeded.

If possible, the full dose of RabIg should be thoroughly infiltrated into the wound and surrounding area. Infiltration of wounds with RabIg in some anatomical sites (finger tips) must be carried out with care in order to avoid increased pressure in the tissue compartment. If not anatomically feasible, any remaining volume of RabIg should be injected, using a separate needle and syringe, intramuscularly (IM) at a site distant from the site of vaccine administration. When more than one wound exists, each wound should be locally infiltrated with a portion of the RabIg using a separate needle and syringe. In such instances, the RabIg can be diluted twofold to threefold in a solution of 0.9% sodium chloride in order to provide the full amount of RabIg required for thorough infiltration of all wounds.

If the site of the wound is unknown, the entire dose should be administered IM at a separate site from where the rabies vaccine is administered. Rabies vaccine and RabIg should never be mixed in the same syringe.

Under no circumstances should vaccine be administered in the same syringe or at the same site as RabIg.

Protective antibodies are present immediately after passive vaccination with RabIg, but they have a half-life of only approximately 21 days. Since vaccine-induced antibodies begin to appear within 1 week, if RabIg is not administered as recommended at the initiation of the rabies vaccine series, there is no value in administering RabIg more than 8 days after initiating an approved vaccine course.

*RabIg is supplied in 2 ml vials containing 150 IU/ml. Use the following formulae to calculate the dose required and use **Table 2** to determine how many vials to order:*

- *20 IU/kg x (client wt in kg) ÷ 150 IU/mL = dose in mL*

  dose in mL ÷ 2 mL/vial = # of vials to order

- *9.09 IU/lb x (client wt in lb) ÷ 150 IU/mL = dose in mL*

  dose in mL÷ 2 mL/vial = # of vials to order

Table 2: Number of 2 mL Vials of RabIg Required per Total Body Weight of Client

Total Weight		*# of 2mL Vials*	*Total Weight*		*# of 2mL Vials*
≤33 lbs	*≤ 15 Kg*	***1***	*>165 – 198 lbs*	*>75 – 90 Kg*	***6***
>33 – 66 lbs	*>15 – 30 Kg*	***2***	*>198 – 231 lbs*	*>90 – 105 Kg*	***7***
>66 – 99 lbs	*>30 – 45 Kg*	***3***	*>231 – 264 lbs*	*>105 – 120 Kg*	***8***
>99– 132 lbs	*>45 – 60 Kg*	***4***	*>264 – 297 lbs*	*>120 – 135 Kg*	***9***
>132 – 165 lbs	*>60 – 75 Kg*	***5***	*>297 – 330 lbs*	*>135 – 150 Kg*	***10***

4.1.2 Rabies Vaccine

Vaccine should be administered IM into the deltoid muscle in older children and adults or into the *vastus lateralis* muscle (anterolateral thigh) in infants but never in the gluteal region as this may result in decreased response to the vaccine.

The rabies vaccine and RabIg should be given at different anatomical sites on day 0 using a separate needle and syringe. For subsequent vaccine doses, the limb where the RabIg was administered can be used.

The vaccination schedule for PEP should be adhered to as closely as possible and it is essential that all recommended doses of vaccine be administered. Although there is little or no evidence, in keeping with routine immunization practice it is recommended that, if a dose of vaccine is given at less than the recommended interval, that dose should be ignored and the dose given at the appropriate interval from the previous dose. If a dose of vaccine is delayed, it should be given as soon as possible and the schedule resumed respecting the appropriate intervals from the latest dose. If the vaccination schedule has been altered such as there is doubt about an appropriate immune response, post-vaccination serology should be obtained 7 to 14 days after completing the vaccination series.

Neutralizing antibodies develop 7 days after immunization and persist for at least 2 years.

Post-exposure prophylaxis should be started as soon as possible after exposure and should be offered to exposed individuals regardless of the elapsed interval. When notification of an exposure is delayed, prophylaxis may be started as late as 6 or more months after exposure.

Based on a risk assessment, and where the specimen is received at the lab within 48hrs of exposure, treatment may be withheld until the Fluorescent Antibody Test (FAT) result is available. The FAT report can be obtained within 6 to 24 hours from receipt of an animal specimen at the laboratory. If the suspect animal is a cat, dog or ferret and is available for observation, then immunization may be withheld pending the animal's status after the 10-day observation period.

However, if the bite wound is to the head and neck region, prophylaxis should generally begin immediately and not be delayed, unless a risk assessment would

support a 10-day observation period instead. Considerations that may support delaying initiation of prophylaxis and instead observing the animal for a 10-day period include:

- *If the animal is a domestic pet;*
- *If the animal is fully vaccinated;*
- *If the bite was provoked; and*
- *If there is very low prevalence of rabies in the area.*

If a rabies exposure is considered likely then PEP should never be delayed.

The vaccine series may be discontinued after consultation with public health/infectious disease experts if the FAT of the brain of an animal killed at the time of attack is negative. However, if suspicion of rabies in the animal remains high, even in the presence of a negative test, the immunization series should be continued.

4.1.2.1 Schedule & Dosage for Immunocompetent Persons

For PEP of immunocompetent persons previously unimmunized with rabies vaccine, four 1.0 mL doses of HDCV or PCECV should be administered IM. The first dose of the four-dose course should be administered as soon as possible after exposure (day 0). Additional doses should be administered on days 3, 7 and 14 after the first vaccination.

4.1.2.2 Schedule & Dosage for Immunocompromised Persons

Corticosteroids, other immunosuppressive agents, chloroquine, and immunosuppressive illnesses (*e.g.* congenital immunodeficiency, human immunodeficiency virus [HIV] infection, leukemia, lymphoma, generalized malignancy) may interfere with the antibody response to rabies vaccine. Refer to Part 3 of the *Canadian Immunization Guide* for an overview of which individuals are considered immunocompromised.[5]

Previously unimmunized immunocompromised persons and those taking chloroquine, should continue to receive a five-dose vaccination regimen on days 0, 3, 7, 14 and 28. Immunosuppressive agents should not be administered during PEP unless essential for the treatment of other conditions.

Determination of antibody response is advisable if post-exposure vaccination is given to those whose immune response may be reduced by illness or medication. In these groups, antibody titres should be determined 7 to 14 days after completing the post-exposure immunization series to ensure that an acceptable antibody concentration has been achieved.

If no acceptable antibody response is detected, the patient should be managed in consultation with their physician and appropriate public health officials to receive a second rabies vaccine series, followed by serologic testing. RabIg should not be repeated at the initiation of this second course.

4.2 Post-Exposure Prophylaxis (PEP) of Previously Immunized Individuals

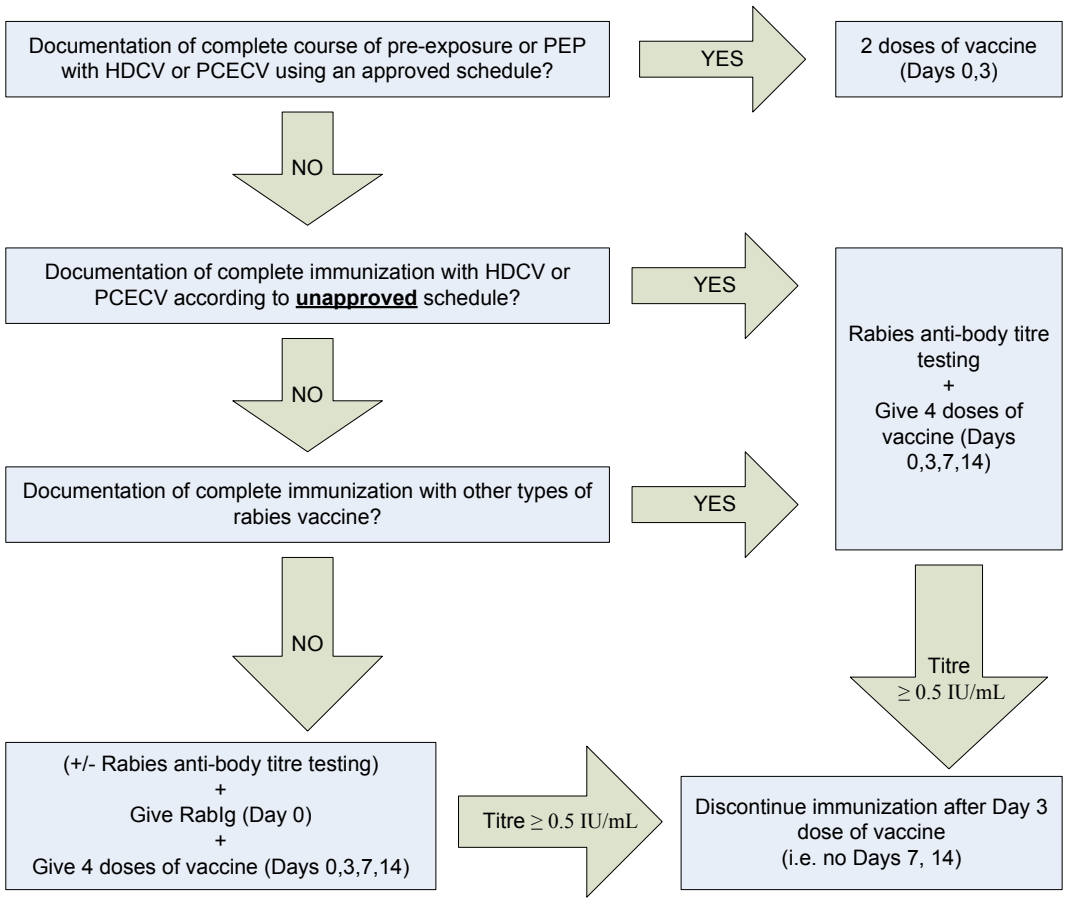
RabIg is not indicated and should not be given to someone who has been previously appropriately immunized as indicated below. In previously appropriately immunized individuals who require PEP, two doses of HDCV or PCECV, one administered immediately and the other 3 days later, are recommended. Appropriate rabies immunization consists of:

- Documentation of a complete course of pre-exposure or PEP with HDCV or PCECV; OR
- Documentation of complete immunization with other types of rabies vaccine or with HDCV or PCECV according to unapproved schedules with the demonstration of an acceptable concentration of neutralizing rabies antibody in serum. Refer to **Section 6, Serologic Testing** for information regarding when serologic testing is recommended.

A complete course of HDCV or PCECV plus RabIg is recommended for those who may have received rabies vaccines in the past but do not fulfill the above criteria for appropriate vaccination. A serum sample may be collected before the initiation of PEP, and if an acceptable antibody concentration (0.5 IU/mL or greater) is demonstrated, the vaccine 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.

Figure 1 *outlines an algorithm for PEP administration schedule for previously immunized individuals.*

Figure 1: PEP Administration Schedule for Previously Immunized Individuals



5. Route of Administration

RabIg is always given IM. If possible, the full dose of RabIg should be thoroughly infiltrated into the wound and surrounding area. If this is not anatomically feasible, any remaining volume of RabIg should be injected, using a separate needle and syringe, IM at a site distant from vaccine administration.

Rabies vaccine for PEP must be administered IM. Both HDCV and PCECV are approved in Canada for IM use.

6. Serological Testing

The Canadian national rabies reference laboratory is the Public Health Ontario Laboratory, which considers an acceptable antibody response to be a titre of at least 0.5 IU/mL by the rapid fluorescent-focus inhibition test. Neutralizing antibodies begin to develop within seven days after starting the immunization series and persist for at least two years. Protective antibodies are present immediately after passive vaccination with RabIg and have a half-life of approximately 21 days.

Because of the excellent immune response to rabies vaccine, healthy people immunized with an appropriate regimen do not require routine antibody determinations after either pre-exposure or post-exposure rabies vaccination, unless one of the following applies:

- Pre-exposure vaccination was given by the intradermal (ID) route – check serology at least 2 weeks after completion of the vaccine series. If using the ID route for a booster dose, serology should be checked at least 2 weeks after the booster dose.
- There has been substantial deviation from the recommended post-exposure schedule – check serology 7 to 14 days after completing the series.
- The person has been immunized with a vaccine other than HDCV or PCECV – check serology at least 7 to 14 days after completing the series.

Where antibody levels are required, a sample of 5cc whole clotted blood, or serum therefrom, should be submitted to the nearest Public Health Ontario regional laboratory or directly to the Public Health Ontario Laboratory (http://www.oahpp.ca/services/laboratory-locations.html). There is no charge for this test. To establish laboratory priority, please indicate the purpose of the sample.

7. Contraindications and Precautions

There are no contraindications to the use of rabies vaccine or RabIg after significant exposure to a proven rabid animal; however, care should be taken if PEP is to be administered to persons who are hypersensitive to the products or to any ingredient in the formulation or component of the container. Expert opinion should be sought in the management of these individuals.

For rabies vaccines and rabies immune globulin, potential allergens include:

IMOVAX® Rabies: neomycin, phenol red

RabAvert®: amphotericin B, chick protein, chlortetracycline, neomycin, polygeline (gelatin)

IMOGAM® Rabies: latex in vial stopper

Persons with egg allergies are not necessarily at increased risk of a hypersensitivity reaction to PCECV. If HDCV as an alternative vaccine is not available, PEP using PCECV should be administered to a person with a hypersensitivity to egg with strict medical monitoring. Facilities for emergency treatment of anaphylactic reactions should be available.

Persons with specific IgA deficiency have increased potential for developing antibodies to IgA after receipt of blood products including rabies immune globulin and could have anaphylactic reactions to subsequent administration of blood products containing IgA, such as RabIg.

Infiltration of wounds with RabIg in some anatomical sites (finger tips) must be carried out with care in order to avoid increased pressure in the tissue compartment.

A history of a serious allergic or neuroparalytic reaction occurring during the administration of rabies vaccine poses a significant dilemma in the post-exposure situation. The risk of rabies developing must be carefully considered before a decision is made to discontinue immunization. The use of corticosteroids to attenuate the allergic response may inhibit the

immune response to the vaccine. The existing titre of rabies antibodies should be determined and expert opinion in the management of these individuals should be sought promptly.

Pregnancy is not a contraindication to PEP with rabies vaccine and RabIg.

Pre-exposure immunization with rabies vaccine should be postponed in persons with moderate or severe acute illness. Persons with minor acute illness (with or without fever) may be vaccinated. Post-exposure vaccination should not be postponed.

8. Other Considerations

Vaccine interchangeability: wherever possible, an immunization series should be completed with the same product. However, if this is not feasible, RabAvert® and Imovax® Rabies are considered interchangeable in terms of indications for use, immunogenicity, efficacy and safety.

9. Additional Resources

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