



Veterinary Clinics and Monkeypox

What is monkeypox?

- Monkeypox (MPX) is a viral infection caused by monkeypox virus (MPXV), a member of the Orthopoxvirus genus. MPXV is a double stranded enveloped DNA virus. Although the virus was first described in monkeys (hence the name), a variety of African rodent species are likely the natural reservoirs, but our understanding of which species are susceptible is poor. It is endemic in wildlife reservoirs in some parts of Central and West Africa.
- In 2022 an outbreak of MPX being driven by human-human transmission has resulted in thousands of human cases in countries around the world. This has created the potential for exposure of animals in non-endemic regions and raised questions about the potential for infection in animals (both wild and domestic), establishment of additional animal reservoirs of MPX, and further zoonotic transmission.
- Currently, MPX in Canada is driven exclusively by human-human transmission, but the risk of spillover into animals cannot be discounted.

How is monkeypox virus transmitted?

- Human-to-human transmission is mainly through direct contact with skin lesions, body fluids or mucosal surfaces of a clinically infected individuals. The role of respiratory transmission is unclear but at a minimum, there is risk from droplet transmission (e.g. direct exposure to droplets generated during coughing or sneezing). Aerosol and airborne transmission risks are less clear. Ultimately close and/or prolonged contact are likely required for significant risk of transmission.
- Traditionally, zoonotic transmission has been associated with direct contact with infected animals, including handling of wildlife and consumption of bushmeat in endemic regions, as well as contact with skin lesions (when present) or bodily fluids, as well as bites and scratches. In a study of occupational risk to veterinary personnel in a US outbreak of MPX associated with contact with infected prairie dogs, not all infected individuals reported having direct contact with prairie dogs. Therefore, shorter term, indirect (e.g. contact with urine, feces or contaminated environments) or aerosol transmission risks must also be considered.
- Human-to-animal transmission risks have not been well investigated, but are presumably similar to human-to-human and animal-to-human transmission risks, with direct contact particularly with skin lesions posing the greatest risk. Prolonged time in the same room, particularly small and/or poorly ventilated airspaces, potentially poses some risk of aerosol transmission.

What animals are susceptible to monkeypox?

- The range of susceptible species is currently not well understood. In areas where the virus is endemic, it has been found in various rodent species (e.g. rope squirrels, tree squirrels, Gambian pouched rats, dormice) and some species of monkey. While the natural reservoir of monkeypox is unknown, rodents are the most likely. The susceptibility of North American rodents and other non-traditional pet mammals is largely unknown. Rabbits may have some degree of susceptibility based on limited experimental data. There is one case report of confirmed infection of a dog living with two infected humans. One survey from an endemic area of Africa showed no seroconversion in cats, but their susceptibility overall is still unknown. It is prudent to assume that any mammalian species may be susceptible to MPXV until clear evidence to the contrary.

Can monkeypox virus be transmitted from infected people to animals?

- Human-to-dog transmission of MPXV has recently been identified in France and Brazil. These are the only confirmed cases of human-to-animal transmission to date, but testing of secondary animal contacts of infected persons has been very limited to date. It is known that infected humans can shed significant amounts of infectious virus into their environment, and that the virus can persist outside the body for days to weeks. Logically animals in direct contact with infected people and living in the same environment will therefore be exposed to the virus, but whether they become infected depends on the susceptibility of the particular species and individual animal.

What clinical signs might be present in an animal with monkeypox?

- Clinical signs in infected animal noted to date depend on the species, the stage of infection and the individual's susceptibility, but include fever, decreased appetite, conjunctivitis, ocular discharge, coughing or sneezing, skin lesions (which may or may not be pruritic) and lymphadenopathy. (<https://www.woah.org/en/disease/monkeypox/>) Most of these are non-specific signs with a wide range of potential causes in animals. The infected dog from France that was recently identified had mucocutaneous lesions, pustules on its abdomen and anal ulceration (Seang et al. 2022), while the dog from Brazil had papules, pustules and crusts over its back and neck.

Are infected animals able to transmit MPXV to people or other animals?

- Zoonotic transmission from reservoir species is the cause of most infections in endemic areas. Zoonotic infection of veterinarians and owners was also identified in a prairie dog-associated outbreak in the US in 2003 (Croft). The risk from other companion animals is unclear. While PCR-positivity does not necessarily indicate infectivity, the presence of PCR-positive active skin lesions is strongly suggestive of infectivity. It should be assumed that any animal with clinical MPX, especially one with active skin lesions, is infectious.
- Subclinical infection likely occurs in reservoir species, including certain species of African rodents that may be kept as pets in some jurisdictions. It is unknown if subclinical infection occurs in dogs, cats or other domestic mammals. It is reasonable to suspect that the risk of transmission would be lower from subclinically versus clinically infected animals.

Care of pets of people with known or suspected monkeypox infection

What is the timeframe of concern?

- In humans, the incubation period for MPX is usually from 6 to 13 days but can range from 5 to 21 days. Infected humans are considered potentially infectious for 21 days, or until all skin lesions have healed over and scabs have fallen off. The potential incubation period in different animal species is unknown.
- A cautious approach is to consider clinically normal exposed animals potentially infectious for 21 days after their contact with a potentially infectious person. If clinical signs suggestive of monkeypox are present in the animal, it should be considered infectious until an alternate cause has been determined, monkeypox is ruled out, or the clinical signs have resolved. The recent canine case developed clinical signs 12 days after the onset of disease in the owners, which would suggest an incubation period similar to that in humans.

Can animals act as fomites by carrying MPXV on their haircoat?

- Monkeypox virus can be transmitted via surfaces contaminated with bodily fluids or debris from scabs. Therefore, it is theoretically possible that an animal's haircoat could harbour viable MPXV if it was in contact with an infected person or environment, but the true risk of fomite transmission via pets is unknown.

Should elective visits be cancelled for exposed pets?

- Ideally, elective veterinary care should be postponed until all humans in animal's household who have contact with the pet are no longer infectious. While the risk of MPX transmission to clinic staff from such a pet is very low, postponing elective veterinary care will eliminate that risk and any potential concerns. This will also facilitate isolation in households where an infected person is present, by reducing the need for an infected person to leave the household, or to have contact with another person to take their animal to a veterinarian.

What should be done if an exposed animal requires more urgent veterinary care?

- Ideally, telemedicine should be used to triage animals to determine whether in-person veterinary care is required. If so, urgent care can still be provided safely with the use of some basic infection control practices (see below).

What measures can be taken to reduce the risk if an exposed animal must be taken to a veterinary clinic?

- Standard isolation practices that are used to reduce direct contact and aerosol transmission are applicable. These include:
 - Examine the animal outdoors, if possible.
 - Admit the animal directly to an isolation area, if it must come into the clinic.
 - Use personal protective equipment (PPE), consisting of a gown or single use lab coat, gloves and a mask. Use of a fit-tested N95 respirator is ideal, but otherwise, a non-fit-tested N95, KN95 or equivalent can be used. Eye protection should also be worn (e.g. face shield, goggles), particularly if there is any chance of body fluid spray or spatter. PPE should be worn for any interaction with the animal or its immediate environment (e.g. carrier, bedding, leash/collar, bandage material).

- Hand hygiene (handwashing or an alcohol-based hand sanitizer) should always be performed immediately after removal of PPE.
- Potentially contaminated items should be disinfected or disposed. Monkeypox virus is susceptible to standard clinic disinfectants but NOT quaternary ammonium compounds. Proper dilution and contact times should be used. Potentially contaminated laundry items should be handled wearing the PPE described above. Bedding and similar materials should be laundered as usual, using hot water. Laundry should be completely dried in a hot-air drier. Items should be handled in such a way as to avoid dispersal of contaminants (e.g. not shaken).
- Biomedical waste should be contained in impervious waste-holding bags or double bagged according to municipal/regional regulations.
- Contaminated disposable items should be discarded according to jurisdictional protocols.
- If hospitalization is required, the animal should be housed in isolation unless precluded by patient care considerations (e.g. need for treatment or monitoring that cannot be done in isolation). In that event, a plan should be made to minimize the risk associated with housing the animal in a general ward, such as maintaining as much physical separation as possible, preventing cross contamination of items and handling the animal and contaminated items using PPE. However, the lack of information about indirect and aerosol transmission makes this an undesirable approach.
- The risk of haircoat contamination with MPXV in an exposed or infected animal is unknown. It is reasonable to consider bathing an exposed animal or wiping it down with a skin-safe disinfectant. However, this may not be appropriate for all animals.

How well does MPXV survive in the environment?

- MPXV can likely persist in the environment for a prolonged period of time. Other related orthopoxviruses are known to be able to persist for weeks or months. This highlights the need to limit environmental contamination from the start, use good infection control practices in potentially contaminated environments, and use thorough cleaning and disinfection. Leaving exposed rooms empty for a period of time is not an effective control measure for any environmentally persistent pathogen.

If an animal is known or suspected to have had MPX, how long should it be isolated?

- It has been recommended to isolate animals with clinical signs of MPX for at least 21 days from the onset of signs. That is reasonable at this time, in the absence of any further evidence. However, reservoir hosts could be infected for much longer periods of time, therefore there is greater concern for prolonged shedding in rodents, which are the most likely reservoir species. Testing, when available, may be useful to help assess the risk over time, but until more information is available, a conservative approach is recommended, especially for rodents or pets with potential clinical infection..

What precautions should be taken if the animal has skin lesions or other clinical abnormalities that could be related to monkeypox virus infection?

- The measures described above are appropriate and no additional measures would be needed. Suspected clinical MPX cases should be reported to the provincial or territorial Chief Veterinarian.

Should animals with skin lesions be tested for monkeypox?

- If an animal has compatible clinical signs with no alternative diagnosis, a history of exposure to an infected individual and the timeframe of exposure are supportive of monkeypox virus infection, then testing should be considered. If there are other, more plausible, explanations for skin lesions, then testing is of less value. Animal testing for MPX is not currently commercially available. Veterinarians who think testing of a particular animal may be warranted should contact the office of the provincial or territorial Chief Veterinarian. Testing may not be warranted in many situations because of the risk of exposure of personnel during sampling, the lack of specific treatments, and the specific requirements for handling and transporting samples from MPX suspects. However, testing can be useful to help understand the risk of human-to-animal transmission and duration of infection in animals.

Should animals that have been exposed to monkeypox be tested?

- Testing of clinically normal animals for MPX is of limited value and is not currently recommended outside of an organized surveillance program.

Should pets be removed from households of people with known or suspected monkeypox?

- This is not recommended. The overall risk to most pets is still low and it is preferred to keep all exposed individuals isolating together rather than moving exposed individuals (people or animals) to another environment. People with known or suspected monkeypox should limit their contact with animals, particularly close and prolonged contact, and prevent contact of animals with any MPX skin lesions. This recommendation applies equally to all animal species. Particular care should be taken with species that might be at higher risk of infection, such as rodents, in which case strict isolation from the infected individual(s) is recommended. If contact with the animal is required for care, it is ideally performed by a household member that is least likely to be infectious (e.g. unexposed, or exposed but not clinically infected).
- Temporary rehoming of the exposed animal could be considered, but this is mostly only useful if the animal has not yet been exposed to the infected person, which would be an uncommon situation (e.g. infected owner returning from travel). Moving an animal that has already been exposed could result in exposure of another household or clinic should the animal develop MPX.
- More details about recommended management of exposed pets can be found here in the Resources sections.
- Human healthcare recommendations for management of MPX exposure and infection can also largely apply to the care of potentially susceptible animals. Examples of those are listed in the Resource section.

What should be done if a veterinary clinic staff member is exposed to monkeypox?

- Veterinary personnel should follow the guidance of their local public health unit. If someone is self-monitoring after exposure and they develop signs that could be

suggestive of early monkeypox (e.g. fever, malaise, headache, lymphadenopathy, myalgia, decreased energy), they should avoid contact with animals until they have been evaluated.

What should be done if a veterinary clinic staff member is infected with monkeypox?

- Infected personnel should follow directions from local public health personnel with respect to guidelines for controlling the risk of transmission to others, which may or may not include a period of self-isolation.

Other questions

Should veterinary clinics be querying monkeypox exposure status of all clients and patients, as was recommended for COVID-19?

- Human monkeypox infections are currently still rare in Canada, so there is limited value in actively querying monkeypox exposure. Requesting information on monkeypox exposure status of clients is not recommended.

In the absence of known exposure to a person with monkeypox, should animals with skin lesions be tested for monkeypox?

- The likelihood of clinical monkeypox in an animal with no known exposure to a person with monkeypox is negligible, given the currently rarity of the disease in Canada.

Resources

Recommendations for handling of potentially exposed animals in veterinary settings

<https://www.wormsandgermsblog.com/2022/08/articles/animals/dogs/what-to-do-with-monkeypox-exposed-pets/>

Guidance for human healthcare settings and contact management

- <https://www.canada.ca/en/public-health/services/diseases/monkeypox/health-professionals/interim-guidance-infection-prevention-control-healthcare-settings.html>
- https://www.publichealthontario.ca/-/media/Documents/M/2020/monkeypox-ipac-recommendations-healthcare-settings.pdf?sc_lang=en
- <http://www.bccdc.ca/health-professionals/clinical-resources/monkeypox>
- https://www.health.gov.on.ca/en/pro/programs/emb/docs/monkeypox_case_contact_mngt_recco.pdf

General veterinary clinic infection control guidance

<https://www.oahn.ca/resources/ipc-best-practices/>