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FOCUS ON

Nipah Virus Infection

Published: March 2026

Introduction

This document explores the emergence, epidemiology, and clinical presentation of Nipah virus infection.

Public Health Ontario (PHO) developed this Focus On to raise awareness of Nipah virus infection among Ontario public health partners and healthcare providers. This resource was developed within the context of cases reported in India in January 2026.

Key Messages

- Nipah virus infection is a zoonotic viral disease associated with consumption of food contaminated by infected animals (including fruit bats which are the natural host) or through direct contact with infected animals in endemic areas in Southern and Southeastern Asia. Human-to-human transmission has been documented in previous outbreaks, including in family members or caregivers of cases, and less commonly in healthcare settings, through close contact with a case or their bodily fluids.
- There is no approved treatment or vaccine for Nipah virus infection, and the virus has a high case fatality rate of 40-75%.

- While Nipah virus is not easily transmissible from person-to-person, it is a priority pathogen requiring prompt identification and management of suspected cases and close contacts.
- Individuals living in or traveling to endemic areas and healthcare workers providing care to suspected cases should practice preventive measures to avoid infection.
- While Nipah virus infection is not currently a reportable human Disease of Public Health Significance in Ontario, it's clinical presentation (i.e., encephalitis) may be. Suspected or confirmed cases in animals are immediately reportable to the Canadian Food Inspection Agency (CFIA). Nipah virus has not been reported in humans or animals in Canada.

Background

Nipah virus (*Henipavirus nipahense*) is a zoonotic paramyxovirus, and the cause of Nipah virus infection in humans and animals. The first human case of the virus is believed to have occurred in 1996, however most initial cases were identified in 1998-1999 during an outbreak impacting pig farmers and other villagers in Malaysia where 256 cases were identified, including 105 deaths, and in 1999 when 11 abattoir workers in Singapore developed Nipah virus infection after contact with pigs that had been imported from Malaysia.[1,2] Transmission in both instances was believed to have occurred through unprotected exposure to the secretions or tissues of pigs that were infected with the virus.[3] Nipah virus subsequently emerged in Bangladesh, with eight outbreaks identified from 2001 to 2008, involving over 120 cases and a case fatality rate of 75%.[1] There were two outbreaks identified in India over the same period, involving over 70 cases and with a case fatality rate of 70%.[1] In contrast to the initial outbreak in Malaysia, pigs were not believed to be the intermediate host of infection for the outbreaks in Bangladesh or India, with evidence suggesting that transmission was primarily person-to-person or foodborne via consumption of fruit or date palm juice that was contaminated with urine or saliva from infected fruit bats.[1,3]

On January 26, 2026, the World Health Organization (WHO) was notified that two laboratory-confirmed cases of Nipah virus infection had been identified in West Bengal, India.[4] The cases were reported to be healthcare workers in the same hospital.[4] As of January 30, 2026, over 190 contacts were identified and tested, all of whom tested negative for Nipah virus infection. The source of exposure has yet to be identified.[4] While Nipah virus disease can affect both humans and animals, it is currently not a reportable disease in humans in Ontario, it's clinical presentation (i.e., encephalitis) may be.[5] However, animal cases of Nipah virus disease in Canada are reportable, and laboratories are required to notify the Canadian Food Inspection Agency if they suspect or confirm that an animal may be infected with the virus.[6] To date, Nipah virus has never been found in humans or animals in Canada.[6,7]

Methods

A literature search was conducted on January 28, 2026, in PubMed using the key words "Nipah virus." Relevant English-language peer-reviewed and non-peer-reviewed records that described Nipah virus and its epidemiology were included. The search concentrated on epidemiological information relevant to Ontario.

A grey literature search of available information from national and international health organizations, including the United States Centers for Disease Control and Prevention (CDC), WHO and United Kingdom Health Security Agency (UKHSA) was also conducted to identify relevant public health and infection control guidance and resources.

Results

Virology

Nipah virus is a zoonotic single-stranded, negative-sense RNA virus in the family *Paramyxoviridae*, within the genus *Henipavirus*.[8,9] Other pathogenic viruses in the same family include Hendra virus (HeV), measles virus, mumps virus, and human parainfluenza virus. The virus is named *Henipavirus nipahense* after the region in Malaysia where the first human cases were identified and is the cause of Nipah virus infection in humans.[1]

Nipah virus has been classified by the WHO as a priority pathogen needing urgent research and development action due to its potential to cause epidemics, with both animal-to-human and human-to-human and transmission documented in previous outbreaks.[10,11] The US CDC and Government of Canada have similarly determined Nipah virus to be a biological agent that has the potential to pose a severe threat to both human and animal health.[6,12,13]

Two major genetic lineages of Nipah virus have been identified through whole genome sequencing; NiV Bangladesh (NiV-B; found in Bangladesh and India) and NiV Malaysia (NiV-M; found in Malaysia).[14] While both strains share 91.8% sequence homology,[15] previous studies have reported epidemiological differences between these strains, with those infected with NiV-B demonstrating a shorter incubation period, increased severity of infection (severe neurological symptoms and severe respiratory distress) and higher case fatality rate (70-90% vs. 40% for NiV-M) compared to those infected with NiV-M.[15–17]

Epidemiology

Fruit bats (genus *Pteropus*), also known as flying foxes or flying fox bats, are the natural host of Nipah virus, and bats carrying the virus do not display signs of infection.[1,6,18,19] Fruit bats are found throughout Asia, the South Pacific and Australia.[20] Human infections with Nipah virus are rare, however people and other animals (including pigs, dogs, cats, goats and horses) may become infected with the virus if they have close contact with an infected animal or its body fluids.[6] Outbreaks of Nipah virus have previously been reported from Bangladesh, India, Malaysia, the Philippines and Singapore.[20] While there have been no recorded outbreaks in Malaysia since 1999, new cases are regularly reported in India and Bangladesh, with outbreaks reported almost annually in Bangladesh since the disease was first recognized in the country in 2001.[3] It is estimated that 754 cases of Nipah virus disease, including over 435 deaths, have occurred globally since the disease was first recognized, with most cases occurring in Southeast Asia.[18]

In previous outbreaks, pigs have been implicated as an intermediate and primary spillover host of the virus, whereby infection is transmitted from bats to pigs through consumption of contaminated fruit, and then from pigs to humans.[1,18,21] Most recent outbreaks have involved direct or indirect transmission of the virus from bats to people, including through consumption of fruits or fruit products contaminated with urine or saliva from infected fruit bats, or from person-to-person transmission.[3,21,22] Person-to-person transmission typically occurs through direct or indirect close contact with the blood and body fluids of an infected person (including through close contact with a case postmortem, or contact with their contaminated clothes or linens), and previous outbreaks have identified instances of transmission of infection within healthcare settings, and more commonly, to family members and caregivers of sick individuals.[3,18,20]

In Bangladesh and India, individual cases and outbreaks of Nipah virus disease coincide with the season in which date palm sap is harvested, with most cases occurring between November and March.[17,18] Date palm sap collection sites may be contaminated with the saliva or urine of infected fruit bats, and if the

date palm sap is consumed without any further processing, humans who consume the sap may go on to develop Nipah virus infection.[18] While there are no species of fruit bat in Ontario or elsewhere in Canada, Ontario residents may be exposed to the virus when visiting Southeast Asia, particularly if working with swine or consuming raw (unprocessed) fruit or fruit products such as raw or partially fermented date palm sap.[6]

It is currently unknown how long the virus may persist in the bodily fluids of an infected person or animal, or in the environment, including on contaminated fruit.[2,6] In a previous study, Nipah virus RNA was detectable for up to 12 days in cerebrospinal fluid (CSF), up to 20 days in throat swabs, and most frequently detected in serum between days 4-10 after onset of illness, with variability noted in PCR positivity among other specimen types.[23] In general, Nipah virus RNA presence peaked during the first 10 days of illness before declining and gradually becoming undetectable.[23] It is unknown whether the virus may be sexually transmitted; NiV RNA was previously detected in the semen of a case, however the viability of the virus in semen is unknown and no known instances of sexual transmission of the virus have been identified to date.[24] Under laboratory conditions, it is estimated that at a temperature of 22°C, Nipah virus can survive for up to 7 days in fruit juices or simulated date palm sap, and can be inactivated by heating at 100°C for more than 15 minutes.[18]

Risk Factors for Infection

Contact with fruit bats or their environment, pigs or other potential intermediate hosts of the virus are an exposure risk for individuals who visit, live or work in areas where the virus is endemic.[19,24] Travellers to endemic areas should be encouraged to avoid contact with bats and their environment, and to avoid contact with animals that appear to be sick, including pigs and other livestock.[24] Travellers to endemic areas should similarly avoid consumption of unwashed raw fruit or fruit products that may have been contaminated by animals, including raw or partially fermented date palm sap.[24]

Evidence regarding duration of communicability for Nipah virus is limited. Individuals infected with Nipah virus are generally presumed to be infectious until 21 days after symptom onset (considering how long viral RNA is detectable in oral and throat swabs and other specimen types)[17,23], with transmission to other individuals associated with close contact, and contact with infectious blood and other bodily fluids, including respiratory secretions.[17] The virus enters the body through the oro-nasal route, with high concentrations of viral antigen in the respiratory and lymphoid tissues of infected patients indicating these tissues as the probable sites of initial virus replication, with secondary replication occurring in the epithelium.[25] A lack of adherence to infection prevention and control (IPAC) measures, including selection and use of appropriate personal protective equipment (PPE [medical mask/fit tested, seal checked N95 respirator, gloves, gown, eye protection]), cleaning and disinfection and hand hygiene may increase the risk of direct or indirect transmission in healthcare settings, including via fomites.[3,7,24,26]

Clinical Manifestations and Disease Severity

In humans, symptom severity ranges from asymptomatic in up to 11% of cases, to mild to severe.[3,17,18,20] As initial symptoms are non-specific, it is difficult to distinguish Nipah virus from other causes of encephalitis or pneumonia without confirmatory laboratory testing.[3] Following initial exposure to the virus, signs and symptoms of infection typically develop within 3-21 days, however in rare instances incubation periods of up to 45 days have been reported.[3] In the early stages of infection, most people infected with the virus develop a fever and other prodromal symptoms involving the brain and/or lungs, such as a headache, confusion, a sore throat, cough or difficulty breathing.[3,17] Additional symptoms may include chills, muscle aches, fatigue, drowsiness, dizziness, or enteric symptoms such as vomiting and diarrhea.[3,17] In the later stages of infection, multiple organ systems may be affected, with symptoms of severe infection including acute respiratory distress, encephalitis and neurological symptoms.[15,27]

Clinical presentation may also differ with the implicated strain of infection.[17,25] While neurological signs are common to both NiV-B and NiV-M, respiratory symptoms, including shortness of breath and acute respiratory distress syndrome, occur more commonly in cases infected with the NiV-B strain of the virus.[27] During previous outbreaks of infection, cases with respiratory involvement were up to 20 times more likely to transmit infection to others compared to those without respiratory involvement.[26–28]

The time from initial fever onset to recovery or death is approximately 14 days.[27] For those who survive infection, relapse of neurological symptoms, including persistent seizures and personality changes, has been observed to occur in 1 in 5 cases (20%) from several weeks to months post-convalescence, and encephalitis due to relapse or virus reactivation has been reported up to several years after initial exposure.[3,18,24,27] Risk factors for poor prognosis include old age, having comorbidities, brainstem involvement or seizures, or thrombocytopenia and raised aminotransferases on admission to a healthcare facility.[25] Factors leading to relapse are currently unknown.[27]

Treatment and Prevention

Treatment for Nipah virus infection is primarily supportive and symptom-based, including hydration, supplemental oxygen or ventilation, dialysis, pain management and anti-inflammatory medication, as required.[3,27] Early diagnosis can support prompt provision of supportive medical care and prevent death.[3] There is currently no approved antiviral, treatment or vaccine available for humans infected by the virus.[9,15,29] Ribavirin, a broad spectrum RNA virus antiviral currently used in the United Sates for treatment of chronic Hepatitis C infection and RSV, was previously used during earlier outbreaks of infection in Malaysia and was estimated, through an open label trial, to reduce mortality by 36% in 140 cases who received ribavirin through oral or intravenous administration compared to 54 controls (historical cases and those who declined therapy).[30] However subsequent analyses of a subset of those cases who received ribavirin did not identify a clear survival benefit, highlighting methodological limitations of the original study.[27] In addition, studies using animal models have not proven efficacy.[15,27,31] An Infectious Disease consultation is recommended for treatment decisions to weigh the benefits and risks of ribavirin therapy, given the significant side effects and known teratogenicity. If ribavirin is considered for the treatment of Nipah virus infection, then patients should be closely monitored due to the high likelihood of side effects, particularly anemia and hyperbilirubinemia.[27]

Infection Prevention and Control

Assessment of patients with compatible signs and symptoms of infection should include assessment of potential exposure sources, including travel to endemic areas, particularly to areas with active outbreaks of Nipah virus, during the three weeks prior to symptom onset, and contact with a confirmed human case, bats, or consumption of potentially contaminated unwashed raw fruit or fruit products, including raw or partially fermented date palm sap, during travel.[27]

Per the Public Health Agency of Canada and WHO, Droplet and Contact Precautions, including the use of a well-fitting medical mask or fit-tested N95 respirator (a fit-tested N95 respirator should be worn for aerosol-generating medical procedures), gloves, gown and eye protection, and placement of the patient in a single room with dedicated washroom are recommended.[3,27,32] Attention is to be paid to proper hand hygiene and donning and doffing of personal protective equipment (PPE) to prevent self-contamination.[1,3] Some jurisdictions further advise that where available, patients with suspected Nipah virus infection and respiratory involvement may be placed in an airborne isolation room with a dedicated washroom.[3,27,33,34] The patient should wear a medical mask during transport or when leaving isolation.[27]

All body fluids and secretions of a suspected case, and any waste generated during patient care, should be considered potentially infectious with Nipah virus until infection is ruled out through confirmatory laboratory testing.[27] The use of needles and other sharps should be minimized to prevent the risk of

accidental occupational exposure.[27] During previous outbreaks involving person-to-person transmission of infection, exposure to respiratory particles during close contact with infected persons and exposure to their body fluids were believed to be the primary modes of transmission.[27,28]

While acquisition of infection by healthcare workers is rare and associated with improper or no PPE, strict adherence to appropriate selection and use of PPE, environmental cleaning and hand hygiene can reduce the risk of transmission in healthcare settings.[19,27,28] A hospital-grade disinfectant with efficacy against enveloped viruses should be used to disinfect environmental surfaces within the patient environment, as previous outbreaks have demonstrated the presence of Nipah virus RNA on surfaces, including patient linens and bedrails.[27]

Laboratory Diagnostics

In Canada, Nipah virus is classified as a risk group 4 (RG4) pathogen, meaning that the virus poses a high risk to the health of individuals and public health. As a result, specimens for human diagnostic testing have specific biosafety, shipping and transportation requirements [2,35] Molecular (PCR) and serology testing for Nipah virus is performed at the National Microbiology Laboratory (NML). All test requests require close coordination between local, provincial and federal partners due to the nature of this pathogen and its associated safety risks.

Testing for Nipah virus is indicated for individuals with compatible signs and symptoms of infection and one or more relevant risk factors (e.g., travel to an area with an active outbreak of Nipah virus, or other high risk exposures).[36,37,19] Real time polymerase chain reaction (RT-PCR) is the preferred method to detect Nipah virus RNA in clinical specimens from acutely ill individuals (including whole blood, serum, fresh frozen tissues, formalin-fixed or paraffin-embedded tissues, CSF or other bodily fluids).[37] Nipah virus serology and culture are non-routine tests that may be performed by the NML for investigational purposes only.[37,38] Serology testing may assist with diagnosis via antibody detection in the later stages of disease. For Nipah virus infection to be confirmed, at least one of the following criteria must be met: (i) detection of Nipah virus RNA by PCR, (ii) detection of antibodies raised against Nipah virus, and/or (iii) isolation of Nipah virus in culture.[37]

Implications for Public Health

Nipah virus is transmissible from person-to-person and based on analyses from previous outbreaks, is estimated to have a basic reproductive number below 1 (R_0<1), meaning that each infected individual is expected to lead to fewer than one additional case of infection, resulting in a low likelihood that an epidemic may occur.[19,28,39] There is no evidence that individuals with asymptomatic Nipah virus infection may transmit the virus to others, however individuals with respiratory involvement have previously been shown to be far more likely to transmit the virus compared to those without respiratory symptoms, and increased duration of exposure and exposure to the body fluids of an infected person are associated with increased transmission risks.[26,28] Given the high fatality rate of the virus, and the potential for the virus to cause outbreaks, particularly if a more human-adapted strain with increased transmissibility from person-to-person emerges, prompt identification of cases and follow-up of close contacts is essential.[40]

Given the potential for person-to-person transmission, individuals who have had close contact within 21 days of symptom onset, with a confirmed or probable case of Nipah virus infection should be identified and monitored for 21 days from the date of last exposure.[18,32] Close contacts include household members and those who had close physical contact with the case, including through contact with their clothes, linens, blood or other body fluids during their illness, or through provision of healthcare without the appropriate use of PPE[26].[18] Identified close contacts should conduct daily temperature monitoring and symptom monitoring, and if a temperature above 38°C or symptoms compatible with Nipah virus infection develop, they should notify public health and seek further medical assessment.[32]

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Citation

Ontario Agency for Health Protection and Promotion (Public Health Ontario). Nipah virus infection. Toronto, ON: King's Printer for Ontario; 2026.

ISBN: 978-1-4868-9744-5

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