

NIPAH VIRUS INFECTION

The following is a an overview of Nipah virus Infection arranged under the following sections

1. Introduction
2. What is Nipah Virus?
3. Transmission of Nipah Virus
4. Signs and Symptoms
5. Diagnosis of Nipah Virus infection
6. Treatment of Nipah Virus infection
7. Prevention of Nipah Virus Infection

A) Introduction

Nipah virus (NiV) is a zoonotic virus, meaning that it can spread between animals and people. Human Nipah virus (NiV) infection is an emerging zoonotic disease which was first recognized in a large outbreak of 276 reported cases in Malaysia and Singapore from September 1998 to May 1999. In India, during 2001 and 2007 two outbreaks in human were reported from West Bengal, neighbouring Bangladesh. Large fruit bats of Pteropus genus are the natural reservoir of NiV. Recently outbreaks have been reported from Kerala in 2018, 2019 and 2021.

Fruit bats, also called flying foxes, are the animal reservoir for NiV in nature. Nipah virus is also known to cause illness in pigs and people. Infection with NiV is associated with encephalitis (swelling of the brain) and can cause mild to severe illness and even death. Outbreaks occur almost annually in parts of Asia, primarily Bangladesh and India.

Nipah virus infection can be prevented by avoiding exposure to sick pigs and bats in areas where the virus is present, and not drinking raw date palm sap which can be contaminated by an infected bat. During an outbreak, standard infection control practices can help prevent person-to-person spread in hospital settings.

B) What is Nipah Virus?

Nipah virus (NiV) was first discovered in 1999 following an outbreak of disease in pigs and people in Malaysia and Singapore. This outbreak resulted in nearly 300 human cases and more than 100 deaths, and caused substantial economic impact as more than 1 million pigs were killed to help control the outbreak.

While there have been no other known outbreaks of NiV in Malaysia and Singapore since 1999, outbreaks have been recorded almost annually in some parts of Asia since then—primarily in Bangladesh and India. The virus has been shown to spread from person-to-person in these outbreaks, raising concerns about the potential for NiV to cause a global pandemic.

NiV is a member of the family *Paramyxoviridae*, genus *Henipavirus*. It is a zoonotic virus, meaning that it initially spreads between animals and people. The animal host reservoir for NiV is the fruit bat (genus *Pteropus*), also known as the flying fox. Given that NiV is genetically related to [Hendra virus](#), another henipavirus known to be carried by bats, bat species were quickly singled out for investigation and flying foxes were subsequently identified as the reservoir.

Infected fruit bats can spread the disease to people or other animals, such as pigs. People can become infected if they have close contact with an infected animal or its body fluids (such as saliva or urine)—this initial spread from an animal to a person is known as a spillover event. Once it spreads to people, person-to-person spread of NiV can also occur.

The symptoms of NiV infection range from mild to severe, with death occurring in 40%–70% of those infected in documented outbreaks between 1998 and 2018

C) Transmission of Nipah Virus

Nipah virus (NiV) can spread to people from:

- Direct contact with infected animals, such as bats or pigs, or their body fluids (such as blood, urine or saliva)
- Consuming food products that have been contaminated by body fluids of infected animals (such as palm sap or fruit contaminated by an infected bat)
- Close contact with a person infected with NiV or their body fluids (including nasal or respiratory droplets, urine, or blood)

In the first known NiV outbreak, people were probably infected through close contact with infected pigs. The NiV strain identified in that outbreak appeared to have been transmitted initially from bats to pigs, with subsequent spread within pig populations. Then people who worked closely with infected pigs began falling ill. No person-to-person transmission was reported in that outbreak.

However, person-to-person spread of NiV is regularly reported in Bangladesh and India. This is most commonly seen in the families and caregivers of NiV-infected patients, and in healthcare settings. Transmission also occurs from exposure to food products that have been contaminated by infected animals, including consumption of raw date palm sap or fruit that has been contaminated with saliva or urine from infected bats. Some cases of NiV infection have also been reported among people who climb trees where bats often roost.

D) Signs and Symptoms

Infection with Nipah virus (NiV) can cause mild to severe disease, including swelling of the brain (encephalitis) and potentially death.

Symptoms typically appear in 4-14 days following exposure to the virus. The illness initially presents as 3-14 days of fever and headache, and often includes signs of respiratory illness, such as cough, sore throat, and difficulty breathing. A phase of brain swelling (encephalitis) may follow, where symptoms can include drowsiness, disorientation, and mental confusion, which can rapidly progress to coma within 24-48 hours.

Symptoms may initially include one or several of the following:

- Fever
- Headache
- Cough
- Sore throat
- Difficulty breathing
- Vomiting

Severe symptoms may follow, such as:

- Disorientation, drowsiness, or confusion
- Seizures
- Coma
- Brain swelling (encephalitis)

Death may occur in 40-75% of cases. Long-term side effects in survivors of Nipah virus infection have been noted, including persistent convulsions and personality changes.

Infections that lead to symptoms and sometimes death much later after exposure (known as dormant or latent infections) have also been reported months and even years after exposure.

E) Diagnosis of Nipah

Nipah virus (NiV) infection can be diagnosed during illness or after recovery. Different tests are available to diagnose NiV infection. During early stages of the illness, laboratory testing can be conducted using real time polymerase chain reaction (RT-PCR) from throat and nasal swabs, cerebrospinal fluid, urine, and blood. Later in the course of illness and after recovery, testing for antibodies is conducted using an enzyme-linked immunosorbent assay (ELISA).

Early diagnosis of NiV infection can be challenging due to the non-specific early symptoms of the illness. However, early detection and diagnosis are critical to increase chances of survival among infected individuals, to prevent transmission to other people, and to manage outbreak response efforts. NiV should be considered for people with symptoms consistent with NiV infection who have been in areas where Nipah is more common, such as Bangladesh or India—particularly if they have a known exposure.

F) Treatment of Nipah

Currently there are no licensed treatments available for Nipah virus (NiV) infection. Treatment is limited to supportive care, including rest, hydration, and treatment of symptoms as they occur.

There are, however, immunotherapeutic treatments (monoclonal antibody therapies) that are currently under development and evaluation for treatment of NiV infections. One such monoclonal antibody, m102.4, has completed phase 1 clinical trials and has been used on a compassionate use basis. In addition, the antiviral treatment remdesivir has been effective in nonhuman primates when given as post-exposure prophylaxis, and may be complementary to immunotherapeutic treatments. The drug ribavirin was used to treat a small number of patients in the initial Malaysian NiV outbreak, but its efficacy in people is unclear.

The latest treatment protocol and guidelines can be accessed from the Technical Documents section.

G) Prevention of Nipah

In areas where Nipah virus (NiV) outbreaks have occurred people should:

- Practice handwashing regularly with soap and water
- Avoid contact with sick bats or pigs
- Avoid areas where bats are known to roost
- Avoid eating or drinking products that could be contaminated by bats, such as raw date palm sap, raw fruit, or fruit that is found on the ground
- Avoid contact with the blood or body fluids of any person known to be infected with NiV

Because NiV can be spread from person-to-person, standard infection control practices and proper barrier nursing techniques are important in preventing hospital-acquired infections (nosocomial transmission) in settings where a patient has confirmed or suspected NiV infection.

Other geographic locations may be at risk for NiV outbreaks in the future, such as regions where flying foxes (bat genus *Pteropus*) live. These bats are currently found in Cambodia, Indonesia, Madagascar, the Philippines, and Thailand. People living in or visiting these areas should consider taking the same precautions as those living in areas where outbreaks have already occurred.

In addition to steps that individuals can take to lower their risk for NiV infection, it will be critical for scientists, researchers, and communities at risk to continue learning about NiV to prevent future outbreaks. Broader prevention efforts include:

- Increasing surveillance of animals and people in areas where NiV is known to exist.
- Increasing research on the ecology of fruit bats to understand where they live and how they spread the virus to other animals and people.
- Evaluation of novel technologies or methods to minimize spread of the virus within bat populations.
- Improving tools to detect the virus early in communities and livestock.
- Reinforcing protocols for healthcare settings on standard infection control practices to prevent person-to-person spread.
- Raising awareness about the signs, symptoms, and risk of NiV among populations at higher risk due to:
 - Geographic location
 - Contact with fruit bats or items contaminated by fruit bats
 - Contact with pigs or animals that could come into contact with fruit bats
 - Work in a healthcare setting or as a caregiver for people infected with NiV