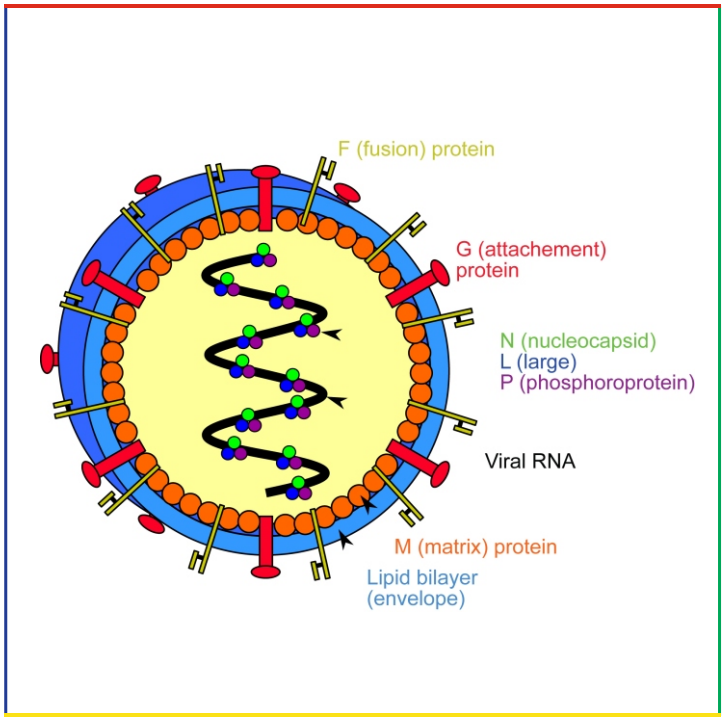
NIPAH Virus Infection

Guidelines for Surveillance, Diagnosis, Treatment, Prevention and Control



DEPARTMENT OF HEALTH AND FAMILY WELFARE

GOVERNMENT OF KERALA

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Message

I am very happy to see that the Department of Health and Family Welfare has published a book on Guidelines to contain outbreak of Nipah. During the first outbreak, there was limited knowledge available regarding various aspects, especially related to actions at the grassroots, but the health system responded very well and contained the outbreak and gained experience. At the time of second outbreak, again the health department along with district administration launched coordinated actions and contained the epidemic.

I am happy to note that the Department constituted a resource group and worked on various aspects of outbreak and drafted the guidelines to tackle NIPAH outbreak. I take this opportunity to congratulate all field functionaries who have shown their commitment and courage to tackle NIPAH outbreak and all officers who have contributed in drafting the guidelines book.

I am confident that such standard operation practice manual will build capacities of all health and other functionaries. It is worth mentioning that a chapter on mock drill is added in the book, which will equip all functionaries with knowledge and build capacities to tackle any future virus outbreak. The framework to build the campaign will be handy for all to plan interventions and execute actions to contain the outbreaks.

I wish all the success.

K K Shailaja Teacher
Minister for Helath & Family Welfare
Social Justice, Woman and Child Development

Foreword

Kerala successively experienced back-to-back two outbreaks of NIPAH. The second outbreak on 3rd June 2019 has made to think of having a systematic approach to deal with any virus outbreaks in future. The first outbreak has taught some lessons and the second accentuated the need of developing the system and processes.

During the second outbreak, the health administration and district administration have coordinated the actions over a period of time. Soon after the detection of the index case, surveillance activities, contact tracing, quarantine, isolation, treatment related follow ups, testing, etc was done. The constitution of the Medical Board, treatment protocol, compassionate use of monoclonal antibody protocol, point of care testing, etc was developed. Later, with the coordinated efforts the outbreak got controlled. The index case got cured and there was no spread to others including family members of the patient.

During the second outbreak, as we were dealing with the situation, we went on building structures and processes. Eg Expert group to decide on use of Monoclonal Antibodies, development of treatment protocol, Institutional Medical Board to decide the next actions for management of the index case, various committees of line departments with specific roles and responsibilities and method of their functioning. The administration has to take care of other aspects such as ensuring the samples are sent to authorized laboratories through well-structured processes and accountability. As it is a biohazard material added additional burden of identifying the authorized officers from various institutions and permitting them to participate in various discussions and the field visits. All these activities needed spot decisions and some method to deal with them. These aspects highlighted to have a detailed 'blue print' of structures and processes for taking various activities to tackle the future outbreaks.

Learning from this experience, it was decided to constitute a resource group of senior faculties of Prevention of Epidemic and Infectious Disease Cell and others departments including a few officers from the field to discuss various aspects related to viral disease outbreak to focus at institutional level and field level activities. At Government level and individual institution level, series of meetings were conducted. A team of senior faculties and the field officers worked on the preparing the guidelines. The objective of this booklet is to have a concise information available for all to plan activities well in time, assist in

capacity building and launch a well-coordinated campaign in case of Nipah outbreak.

This book also covers the framework for the 'mock drill' concept. This concept was discussed in the meeting of PEID Cell on 8th May 2019. It was discussed that countries like Japan and Israel conduct the mock drill regularly to ensure preparedness. It was decided to develop a mock drill guideline. Later discussions were conducted involving World Health Organization experts. The resource group worked on the same to have a system of 'mock drill' to do assessment of preparedness of health system and overall administration. This is a noteworthy aspect which shows the advance thinking to handle any exigency.

The book also gives information on building a campaign. At the time of formulating the plan, it was discussed whether we should say ' No Nipah campaign". It was intentionally done in order to infuse seriousness regarding the prevention focus to control such a dreaded virus outbreak.

During these discussions the Department had taken a decision to equip themselves to tackle any viral outbreak and in September 2019 procurement orders for Personal Protection Equipment were placed with the companies by doing transparent bidding. This has proved the best intervention as few months down the line, the whole world landed in COVID pandemic from January 2020.

It was decided to publish this book after the 'mock drill', along with mock drill output in January 2020. But, as we all know, from January 2020 onward the whole world started grappling with COVID pandemic, that has caused delays in publishing this book. However, the experience of handling NIPAH second outbreak has assisted Kerala Health to tackle COVID from the day one in a coordinated way without wasting a minute!

It is decided to do annual review of the guidelines and publish updated version in the web portal of the department. We appreciate the contribution of all experts and field officers. We look forward to their continued support. We solicit the suggestions from all experts in the field

Dr Rajan Khobragade
Principal Secretary
Department of Health and Family Welfare
Government of Kerala

Chapter 1. Epidemiology, burden of disease, transmission

Introduction:

Nipah Virus (NiV) Infection is recognized as a deadly infection in 1998 but came to a better attention in Kerala with the outbreak in 2018 and 2019. In this chapter we are trying to look very briefly about the NiV, the transmission, epidemiological aspects and the magnitude of the disease burden. This will help us to plan strategies for preparedness, early detection and timely management and appropriate interventions to tackle the situation on an urgent basis.

1.1 Epidemiology

- **Agent: Nipah Virus (**NiV) is a highly pathogenic RNA virus belonging to the *Paramyxoviridae* family and grouped under the genus *Henipavirus. Two NiV clades have been proposed so far; B genotype in Bangladesh, and M genotype in Malaysia.* The complete NiV genome of the Kerala strain had 85.14%–96.15% similarity with M and B NiV genotype.
- **Natural Reservoir:** Large fruit bats of *Pteropus* genus are the natural reservoir of NiV. Pigs are identified as intermediate hosts. In a study conducted during this outbreak 2018, the high positivity of NiV was detected in bat throat swabs, and showed persistence of virus for a couple of hours on contaminated fruits, which enhance the chances of human infection. NiV positivity was identified in bats from North Eastern Region states and Kerala.
- **Seasonality** was strongly implicated in NiV outbreaks in Bangladesh and India. All of the outbreaks occurred during the months of December to May.
- **Incubation period:** varies from 4-14 days.

1.2 Burden of disease: In the 1998 to 1999 Malaysian outbreak, human infection occurred from infected bats through infected pigs as intermediate animal host by direct contact with respiratory secretions and urine from infected pigs. In Bengladesh and India the transmission happened from bat to human and later from human to human. So far two outbreaks are reported from Kerala. From Kozhikode in 2018 and Kochi in 2019. The outbreak reported from Kerala in May 2018, there were one index patient, 18 confirmed and 4 probable cases. Two confirmed patients survived

in that outbreak. In Kochi, May 2019 one patient was confirmed of Nipah but no further spread was identified. India comes within the Nipah virus distribution map and there is a risk of spill over and transmission to humans. The delay in diagnosis will increase the chance of spread to humans through the risk of increased human to human spread. The knowledge about the ecology of bats and NiV and the seasonality of the disease is important in prevention of future outbreaks.

1.3 Mode of Transmission:

Human infection results from spillover transmission from bats or through human-to-human transmission. Direct bat-to-human transmission occur through fruits contaminated by bat's secretions - urine or saliva- or consumption of raw date palm sap [*tari*] contaminated by bat saliva. In the Malaysian outbreak, human infection occurred through contact with respiratory secretions and urine from infected pigs, which got infected after consumption of partially bat eaten fruits, dropped in pigsty. The infection got controlled once the cause of infection was identified and health education, barrier precautions were advised to people handling the pigs and pig culling operations were conducted. Unlike Malaysia and Singapore, the outbreaks in Bangladesh and India pigs were not identified as intermediate hosts and transmission was from bat to human and human to human. In the 2014 Philippines outbreak, infected horses were identified as the intermediate hosts.

Clustering of symptomatic cases mainly adults among close contacts and households is an important clinical clue to this infection. In 2018 Kerala outbreak, all cases except the index case the transmission was from human to human.

Chapter 2. Diagnosis and Surveillance

Introduction

Early identification and diagnosis is of prime importance in NiV infection. The case management includes strategic plans to prevent spread through contacts and this requires proper triaging and isolation. Understanding definition of cases and contacts becomes very important here.

2.1 Definitions - Case and Contact

1. Case Definitions

a. Suspect Nipah Case

Person from an area/ locality affected by a Nipah virus disease outbreak who has:

- Acute Fever with new onset of altered mental status or seizure and/or
- Acute Fever with severe headache and/or
- Acute Fever with Cough or shortness of breath

b. Probable Nipah case

- Suspect case-patient/s who resided in the same village where suspect/confirmed case of NIPAH were living during the outbreak period and who died before complete diagnostic specimens could be collected

  OR
- Suspect case-patients who came in direct contact with confirmed case-patients in a hospital setting during the outbreak period and who died before complete diagnostic specimens could be collected.

c. Confirmed Nipah Case

Suspected case who has laboratory confirmation of Nipah virus infection either by:

- Nipah virus RNA identified by PCR from throat swab, urine, serum or cerebrospinal fluid (optional).
- Isolation of Nipah virus from throat swab, urine, serum or cerebrospinal fluid.

d. Definition of a contact:

A Close contact is defined as a patient or a person who came in contact with a Nipah case (confirmed or probable cases) in at least one of the following ways.

- Was admitted simultaneously in a hospital ward/ shared room with a suspect/confirmed case of Nipah virus disease
- Has had direct close contact with the suspect/confirmed case of Nipah virus disease during the illness including during transportation.
- Has had direct close contact with the (deceased) suspect/confirmed case of Nipah virus disease at a funeral or during burial preparation rituals
- Has touched the blood or body fluids (saliva, urine, vomitus etc.) of a suspect/confirmed case of Nipah virus disease during their illness
- Has touched the clothes or linens of a suspect/confirmed case of Nipah virus disease

These contacts need to be followed up for appearance of symptoms of NiV for the longest incubation period (21 days). They must be transported to appropriate care facility if they develop symptoms with proper infection control practices.

2.2 Clinical features

- Fever, Altered mental status, Severe fatigue, Headache, Respiratory distress, Cough, Vomiting, Muscle pain, Convulsion, Diarrhoea
- In infected people, Nipah virus causes severe illness characterized by inflammation of the brain (encephalitis) or respiratory diseases.
- The syndromic presentations are ARDS, Myocarditis and Encephalitis. Patients can present with fever alone. All patients coming with fever with any other symptom having an epidemiological link and history of contact must be treated as NiV infection and must be tested for the NiV infection.
- In general, the case–fatality rate is estimated at 40–75%; however, this rate can vary by outbreak and can be upto 100%.

2.3 Laboratory diagnosis

2.3.1 Investigations to be done for confirmation of diagnosis

Real-Time RT-PCR Viral RNA

anti-NiV IgM and IgG antibodies by enzyme-linked immunosorbent assay

2.3.2 Sample collection and transport and testing guidelines

Laboratory confirmation of a suspect and also a symptomatic with definite history of contact case can be made during the acute and

convalescent phases of the disease by using a combination of tests. The samples have to be sent to designated laboratories identified as per protocols prepared.

Sample Collection and Transport Guidelines:

Universal, standard droplet and bio-containment precautions should be followed during contact with excretions, secretions and body fluids of suspected patient for Nipah virus. Adequate bio-safety precautions should be adopted during collection/transport/ storage/ processing of suspected sample.

Sample collection:

The samples should be collected in all patients (suspect or symptomatic with contact with Nipah) as early as possible with all bio-safety precautions and documening the clinical details on the proforma (provided from the testing laboratory).

Sample collection should be done only AFTER ADMISSION into an isolation facility, and ensuring that the staff member doing the collection is following proper infection control practices.

During sample collection wear complete disposable Personal Protective Equipments (N 95 mask, double surgical gloves, gowns, goggles foot cover, etc). Wash hands with soap and water at least for 30 seconds and then clean hand using alcohol based hand sanitizer before and after collection of samples.

The recommended samples are

- Throat swab in viral transport medium
- Urine 5 ml in universal sterile container
- Blood in red vacutainer (5ml)
- CSF (1-2 ml) in sterile container

Transportation and Storage of samples:

- Samples should be safely packed in triple container packing and should be transported securely under cold chain (2-8°C) to the testing laboratory with prior intimation.
- Sample containing vials, tightly closed, should be kept in good quality zip-lock bags wrapped with sufficient absorbent cotton padding so that inside material should not come out of bag if it leaks. The plastic bag should be kept in another Zip-lock bag similarly, which should be sealed with adhesive tape. This carrier

should be placed in a hard container sealed with impermeable tape or plaster and placed in thermocol box /vaccine carrier containing ice packs. The case sheets with complete information should be placed in plastic bag and should be pasted **outside the container**.

- Samples should be transported at 2-8°C to the have to be sent to NIV Pune, NIV field station, Alappuzha or as per the testing protocols.

2.3.3 Disposal of supplies/waste:

The proper disposal of biomedical waste is a challenge in such type of infections. Must be done adhering to strict infection control practices to ensure safety of all personnel involved. This has to be supervised and properly co-ordinated by the hospital infection control committee.

2.3.4 Point of care testing (POC):

Early diagnosis was a challenge for appropriate prompt management in outbreak 2018. High containment laboratory facility for quick diagnosis was identified as a need for the same. In Government Medical College, Ernakulam during 2019 outbreak a POC micro PCR assay for NiV detection and ELISA testing facility could be started with technical support from NIV, Pune. If such facilities are available, it must be utilized. The facility for screening dengue, Japanese encephalitis and West Nile virus infection in all NiV negative cases will help to narrow down the diagnostic possibilities in seriously ill patients. This will help to incorporate appropriate modifications in the management

2.3.5 Other Investigations for patient management

NiV infection is similar to any other viral infection and it is a clinical challenge to diagnose it early and to ensure all safety measures and infection control practices to prevent human to human transmission. Nipah virus is classified as a biosafety level 4 pathogen. The laboratory should be informed if a clinical suspicion is made and the facilities must be the same for all other investigations done for the patient considering its high pathogenicity in humans. All treatable cases like bacterial infections, malaria and herpes encephalitis must be included in the differentials depending on the clinical presentation. Tests must be ordered appropriately.

2.3.6 Surveillance

Case identification and Contact tracing:

These contacts need to be followed up for appearance of symptoms of NiV for the longest incubation period (21 days). They must be transported to appropriate care facility if they develop symptoms with proper infection control practices.

Risk Stratification of Contacts

RISK CATEGORY	DESCRIPTION
High risk	1. Any contact with body fluids (blood, urine, saliva etc) of a confirmed case of Nipah 2. Any contact with body fluids of a probable case who died without a lab confirmation of Nipah 3. Spend time in close proximity or in closed space for more than or equal to 12 hrs
Low risk	Any other contact such as touching, contact with clothes or linen or any other item used

Follow-up Action

RISK CATEGORY	Follow-up Action
High risk	Asymptomatic- Home quarantine with active follow up for fever, by health workers using telephone, twice a day for 21 days Symptomatic (fever)- Immediate admission in designated isolation ward with ICU facility
Low risk	Asymptomatic- Home quarantine and follow up for fever by telephone. Symptomatic (fever)- Immediate admission in designated isolation facility

Format for Contact Tracing

Sl.No	Name of the Case	Name of the Contact	Age	Sex (M/F/TG)	Occupation	Address	Ward No.	Panchayath/ Municipality/Corporation	District	Ph. No.	Date of last contact with the case (DD/MM/YYYY)	Place of contact with the case [Eg; Room no. 3 Medicine opd, Ashwini hospital, thrissur	Contact with body fluids of the case (Y/N)	Touched the case/ dead body (Y/N)	Contact with anything used by the case [eg; clothes ,utensils,trolley,bedetc](Y/N). If yes, please specify	Spent time with the case in the same room/vehicle/ closed space (Y/N). If yes, please specify	Time spent with the case (Please specify in minutes/hours)	Type of contact 1. Household contact 2. Hospital contact 3. Community contact	Name & Phone no of the person who collected the information

Chapter 3. Management of Nipah virus infection

Introduction:

NiV infection is different from other viral infections or pathogens because of its potential of transmission from human to humans with high mortality and no definite treatment or vaccine so far identified. So the management essentially involves infection control practices and triaging, isolation and management of patients including intensive supportive care. The Emergency Department must be strengthened for early identification, proper isolation and management of patients suspected of NiV infection to minimize the risk of human to human transmission.

To manage the fever triage and isolation facility, a separate team should be trained and appropriately delegated for its implementation. The team should include health care providers as a single unit. The senior cadre nurses must be responsible for maintaining the overall co-ordination, in charge of movement and sick registers of the health care providers, ensuring the proper donning and doffing, auditing of the appropriateness of training of the health care providers, ensuring of all supplies including drugs, disposables and consumables, food and other supplies for patients in the isolation unit etc. The area must be strictly restricted to the purpose and clearly demarcated. Collection and transportation of samples must be documented and reports must be properly collected. The preparation and handling must be done as per protocols in designated area and with appropriate co-ordination.

The important points in management are discussed in detail below.

3.1 Triaging of patients

- **All patients having fever must report to Fever triage from where they will be sent to the isolation facility**
- Ensure strict adherence to proper Triaging
- **Proper infection control practices must be followed up.**
- Ensure personal safety. Wear apron and gloves as appropriate.
- General measures – ABCDE approach (Airway, Breathing, Circulation, Disability, Exposure)
- Plan for appropriate care including intensive supportive care

The most important step in patient care is intensive supportive care.

3.2 Setting up an isolation facility

Who should be kept in isolation facility/ward/ICU

- History of close contact with confirmed case presenting withfever or any symptoms suggestive of Nipah infection (*vide* clinical features)
- Health care provider who has come in contact with the patientwith fever / severe headache/altered sensorium/breathlessness/cough
- Patients with high clinical suspicion – Encephalitis/ARDS/Myocarditis during an outbreak

Isolation facility

- Enter all the details of HCWs entering the isolation facility in the Register for ensuring appropriate follow up
- Only HCWs trained in infection control practices should be posted in the isolation facility.
- Monitor staff health, sick people should not be allowed at work.
- They must report immediately through the contact numbers provided if they develop any health related problems during the period and up to another 21 days after the last day of duty
- Infection control practices should be strictly adhered and audited
- Proper instructions should be followed while entering the room
- The entry of the health care provider should be through Donning area, and then to the triage or treatment area. The exit should be separate for the health care provider and there should be facility for doffing and appropriate facility for hand washing / bathing.
- Patient entry and shifting should be separately marked.
- The deceased should be handled separately as per protocols.
- Single room with attached toilet facility must be provided for each patient.
- Separate equipments (BP apparatus, Stethoscope, Thermometer, Pulse oximeter) for each room and use only disposable consumables to be used.

3.3 Treatment

3.3.1 Supportive measures including Standard care of ARDS, Myocarditis and Encephalitis

Standard care must be provided as in any other infection presenting with Encephalitis, ARDS, and or Myocarditis.

Care should be individualized according to the clinical

presentation and management decisions of the treating clinician.

The basic supportive measures are outlined below:

a. Isolation of patient in the isolation facility □
b. Use of PPEs □
c. Hand washing with soap & water before and after handling/visiting patients □
d. Resuscitation (if needed): ABC : □Airway,□Breathing , Circulation □
e. Care of unconscious patient: change of posture, care of eye, bladder, bowel and mouth □
f. O_2 inhalation if there is respiratory difficulty □
g. Nutritional support: oral/NG tube feeding according to the condition of the patient □
h. Maintain fluid and electrolyte balance (Adults: 5% DNS, Children: 5% DNS, half or □quarter strength saline) □
i. Fluid restriction: 30% restriction particularly in children. 2/3 of the daily maintenance □can be given in children if the child is not in shock □
j. Maintain intake output chart □
k. Bronchodilators when needed may be given through spacers

3.3.2 Drug Treatment options

No approved drugs or vaccines are currently available. There is an unmet need for newer therapeutic options for NiV infection. In diseases like NiV infection, any new drug can be tried only during an outbreak situation and that too strictly adhering to the clinical trial protocol. Hence preparedness is a priority for any future outbreak as the need occur as an emergency. Nipah clinical research facility needs to be adhering to infection control practices, isolation facility, trained clinical and laboratory team and patient and family support for timely information and consenting.

Currently the available treatment options are very limited.

3.3.2 .1 Ribavirin

Ribavirin, a nucleoside analogue with broad activity against several RNA and some DNA viruses. Used in Malaysian outbreak in an open label trial with 36% reduction in mortality, but further studies in animal models proved ineffective.

In the Kerala outbreak 2018, the drug was started in 10 patients, both the survivors have received full course of treatment. The dose used was 2 g stat, 1 g 6 hourly 4 days followed by 500mg 6 hourly for 5 days (based on WHO guideline for other haemorrhagic fevers) on confirmation of NiV infection. (Available as 200 mg capsules – Day 1- 10 capsules stat, then 5 capsules of 200 mg 6 hourly for first four days followed by 200 mg capsules 3-2-3-2 for 5^{th} to 10^{th} day – total of 150 capsules). No major side effects reported with Ribavirin. In Kerala outbreak 2019, the one patient with confirmed NiV infection had received Ribavirin but started only on confirmation by 9^{th} day of illness.

Adverse effects of Ribavirin: Rare if used for short term. The Major adverse effects on long term treatment are hypersensitivity, hemolytic anemia, ssignificant teratogenic and/or embryocidal effects in animal studies, bone marrow suppression. The complete haemogram and LFT need to be monitored. Patients received Ribavirin must be counselled about the teratogenicity as it may persist in non-plasma compartments for as long as 6 months. Hence effective contraception must be utilized upto 6-months after the drug use.

3.3.2.2 Monoclonal antibody m102.4

M102.4 recognizes the G envelope protein of NiV and appears to block the receptor binding site on the protein preventing adhesion to the Ephrin B2 protein and thereby inhibiting viral entry into the host cell.

During the NiV outbreak in Kozhikode, Kerala in 2018 the m102.4 monoclonal antibody, an experimental therapeutic, was imported for treatment of NiV infected patients on compassionate ground. The SOP (Standard Operating Procedures) and protocols were prepared with the support from ICMR. But it was not used as the outbreak was ended by that time. In Kochi 2019 outbreak as there were no new confirmed cases and the patient was towards the recovery phase when the NiV infection was confirmed, the drug was not used. The protocols, the drug, facility and trainings were started in anticipation . The m102.4 monoclonal antibody is an investigational drug and requires Emergency Research Response

& Resources for using such an investigational drug. This becomes a high priority area because of the high mortality of this infection.

The indications and guidelines for use of m102.4 is prepared and to be used with appropriate knowledge and training of the research team as in any other clinical trials with Ethics committee approvals and consenting process. The protocols and SOPs must be referred in detail in this regard and to be modified appropriately according to the then available scientific knowledge.

3.3.3. Standard care for Encephalitis, Myocarditis and ARDS

a. Standard care for encephalitis

Patients with increased intracranial pressure

- Management of fever, pain, control of cough and other strains. Manage Fever, pain with paracetamol, avoid NSAIDs
- Prevention of seizures
- Control ofsystemic hypertension
- Elevate head above the heart (usually 30 degrees)
- Furosemide 0.5 to 1.0 mg/kg IV and / or mannitol 1 g/KgIV over 30-60 minutes, Repeat dosing can be given as needed, generally every eight hours–provided circulatoryvolume is protected
- IV Sedation and mechanical ventillation

Seizures

- o Lorazepam 4 mg IV or
- o Phenytoin 100mg IV q6-8h or
- o Fosphenytoin 150PE q8h IV or
- o Levetiracetam 500mg q8-12h IV

b. Standard care for myocarditis

Supportive therapy for symptoms of acute heart failure with use of diuretics, nitroprusside, ACE inhibitors.

- Inotropes- Dobutamine- 2–5 micrograms/kg/ min, titrated up to 20 micrograms/kg/min- Inotrope and potential vasodilator; lowers blood pressure; give as individual agent as long as systolic blood pressure (SBP) $\geqslant$90. Can use with dopamine.
- Dopamine-3–5-micrograms/kg/ min, titrated up to 20micrograms/kg/ min as needed-Inotrope and vasoconstrictor; increases left ventricular end-diastolic

pressure and causes tachycardia. Can beused withdobutamine.

- Norepinephrine-2 - 50 micrograms/min (0.02 – 2 micrograms/kg/minute) titrate to response-Vasoconstrictor and inotrope; preferred as a single agent over dobutamine if SBP <70. Can use combined with dobutamine.

c. Standard of care for ARDS

- For mild ARDS, non invasive ventilation stands as the first-line approach.
- Patients who have a diminished level of consciousness, vomiting, upper GI bleed, or other conditions that increase aspiration risk are not candidates for NIPPV.
- Other relative contraindications include hemodynamic instability, agitation, and inability to obtain good mask fit
- Severe ARDS is often associated with refractory hypoxemia, and early identification and treatment of hypoxemia is mandatory.
- For mechanical ventilation specific settings are recommended: limitation of tidal volume (6 ml/kg predicted body weight), adequate high PEEP , a recruitmentmanoeuvre in special situations, and a 'balanced' respiratory rate (20-30/min)for appropriate baseline minute ventillation. Consider the use of incremental FiO_2/PEEP combinations to achieve oxygenation goal (PaO_2 55-80 mm Hg or SpO_2 88-95 %)

3.3.4 Other therapeutic options

No approved drug so far. As NiV is an infection with definite potential for human-to-human transmission and high mortality we must be ready to accept newer therapeutic options in any future outbreaks. The preparedness for research well in advance of the outbreak is the priority in this infection.

3.3.5: Psychosocial interventions: For the patient, for those contacts kept in isolation facility for testing, family members and community contacts must be planned and administered.

3.4 Criteria for discharge and follow up

Criteria for discharge of a patient from isolation facility presented with suspected Nipah and tested negative

1. Tested negative and totally symptom free can be discharged with observation at home for total of 21 days.
2. Tested negative and continue to have fever and other symptoms need a repeat testing after two days to exclude NiV infection and there exist a strong history of contact with NiV infected patient/sample must have repeat testing in every two days till patient becomes symptom free.
3. No need of repeat testing if tested negative on two occasions found negative and an alternate diagnosis is made.

Criteria for discharge of confirmed case

- Clinically stable
- Nipah RT-PCR from all three samples (Throat swab, Urine and blood)reported negative on two occasions at least 5 days apart.
- To be decided by the treating clinician and confirmed by the Medical board

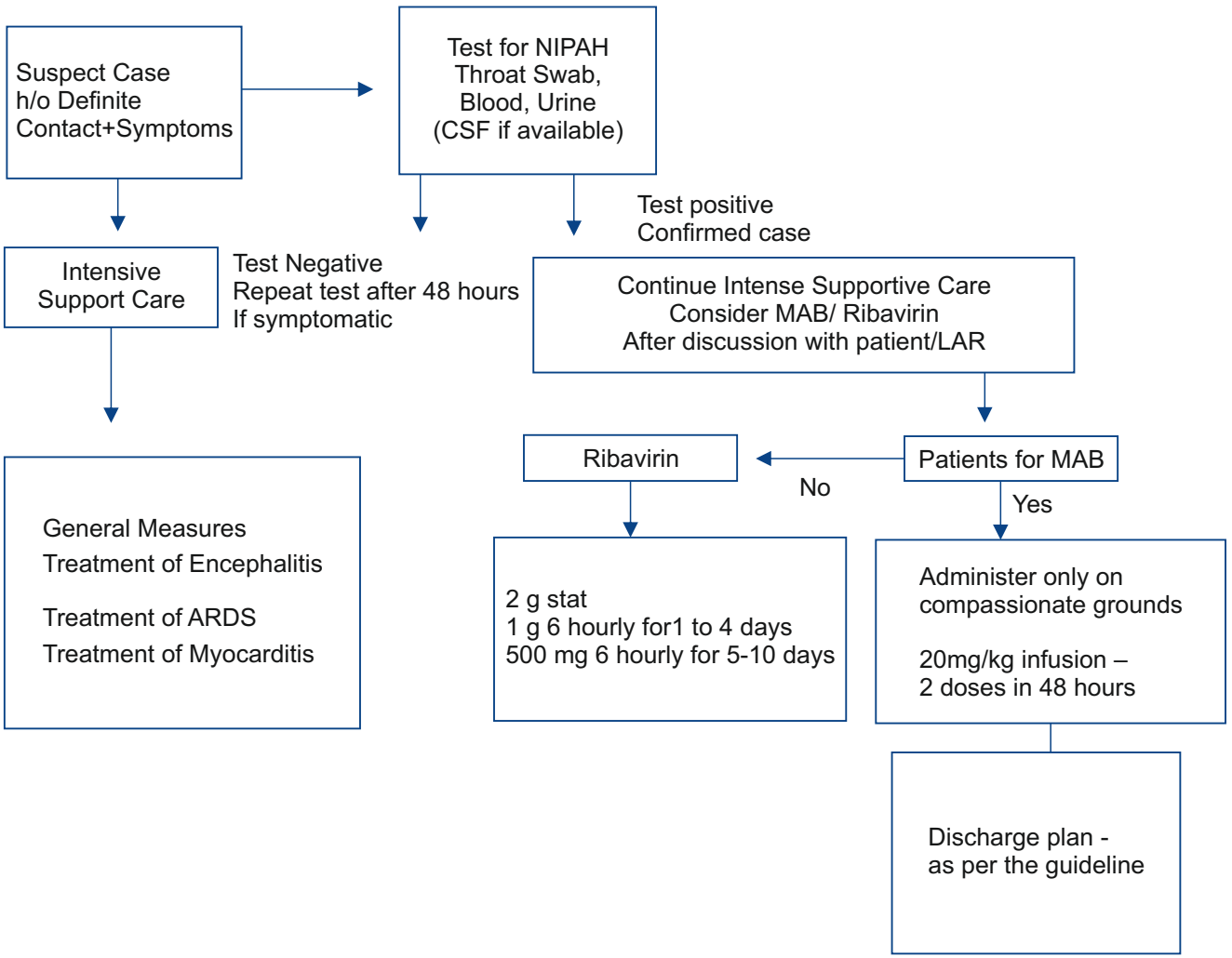
Follow up

The discharged patient should remain in isolation at their residence for 4 weeks after the discharge.

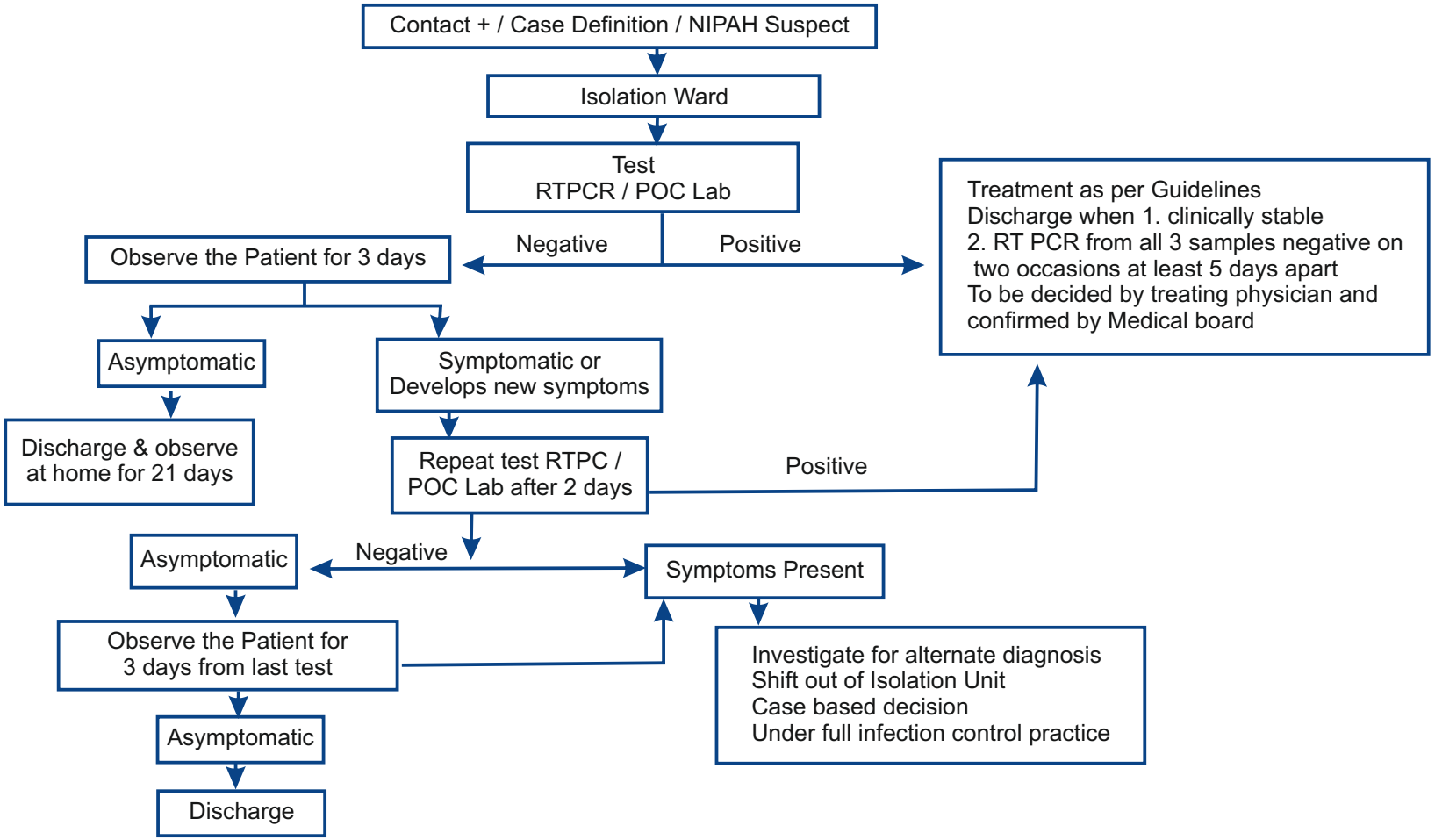
Patient is advised follow up on 28days, 56 days and 90 days of discharge

All patients with confirmed NiV infection should be kept under long term follow up as there were reports of relapse and late onset encephalitis in an earlier series.

TREATMENT ALGORITHM



GUIDELINES FOR DISCHARGE OF PATIENTS



NB: Any amendment to this Guidelines be done only with the concurrence of Medical Board

No Nipah campaign

Background

Nipah virus infection is a deadly zoonotic disease with high rate of human to human transmission. It is an enveloped ribonucleic acid virus, has been a major cause of encephalitis out-breaks with high mortality, primarily in the Indo-Bangladesh regions. 1The name 'Nipah' comes from a Malaysian village, where the first outbreak was reported in 1998-1999.The outbreak subsequently spread to various regions of the country and Singapore in the south due to the movement of infected pigs. Nipah virus caused systemic infections in humans, pigs and other mammals. 2Malasyia, Singapore, Philippines and Bangladesh reported the previous outbreaks.

In India, previous outbreaks of Nipah virus occurred in Siliguri (2001) and Nadia(2007)districts of West Bengal.Kerala faced this epidemic in May 2018.A total of 19 Nipah virus (NiV) cases, including 17 deaths, were reported from Kerala State: 18 of the cases were laboratory-confirmed and the deceased index case was suspected to have NiV but could not be tested. The outbreak was localized to two districts in Kerala State: Kozhikode and Malappuram. – 3Transmission of the infection occurred predominantly in the hospitals.The human to human transmission rate was very high in the Kozhikode outbreak, consistent with rates of NiV outbreaks in India and Bangladesh but different from the rate in Malaysia. Several factors contributed to the high transmission rate in the hospital. They include inadequate barrier infection control measures, lack of hand washing, altruistic behaviour of patient companions, poor regulation of visitors in the hospitals, extended period of waiting for procedures and the movement of index case within the corridor.–4

When Kerala faced an outbreak, there was no previous experience in tackling such health emergencies. Intense measures were initiated by the state with the help of central government health authorities including the National Centre for Disease Control, National Institute of Epidemiology, Indian Council of Medical Research (ICMR), Manipal Institute of Virology and experts from AIIMS, New Delhi.The outbreak drew immense global attention and underlined the need for adequate preparedness in the event of such episodes resurging in the future.5

In June 2019, one case of Nipah was reported from Ernakulam district. The outbreak control activities led to the containment of the outbreak to just one

case. In this background Government of Kerala has initiated the **'No Nipah campaign'**to prevent further outbreaks in the state.

No Nipah campaign envisages strategies to educate the public regarding the potential sources of infection and modes of transmission and bring behavioural change so as to avoid the first case.It also focusses on strategies to be implemented in the health care system in the perspective of hospital infection control practices.Minimising the human animal interaction which is the vulnerable and key event in acquiring an infection as well as enhancing infection control practices in the community and hospital premises with community participation plays the pivotal role.

Objectives

1. To prevent the occurrence of human cases of Nipah through behaviour change interventions and infection prevention and control practices.
2. To limit the impact, in the event of a Nipah outbreak through prompt response and containment.

Strategies

1. Health literacy campaignto prevent transmission in the community with focus onbehaviour change communication.
2. Strengthen infection control practices in the hospitals through training of health care staff and capacity building.
3. Strengthening the surveillance for Nipah virus
   (a) In tertiary care hospitals through Outbreak Monitoring Units (OMU) attached to PEID(Prevention of epidemic and infectious diseases) cells.

   Activation of OMU – Immunocompetent patients presenting with any of the features like severe pneumonia/ ARDS, haemorrhagic rash, severe Gastro enteritis, meningoencephalitis, acute liver failure shall be evaluated and if the cause cannot be ascertained through routine investigations, further evaluation should be done to rule-out tropical fever syndrome is like dengue fever, leptospirosis, scrub typhus, chikungunya, malaria, enteric fever, H1 N1 etc and expected community acquired syndromes. OMU shall be activated if there is history of Zoonotic contact, clustering of cases in the family/locality, travel to forest areas/Outside the state or fever death without a diagnosis in immunocompetent patients. The experts in the OMU shall decide on further laboratory diagnosis, including field

investigation and notification as required.

(b) In primary and secondary hospitals through reporting.

(c) Animal health surveillance.

4. Strengthening the diagnostic and treatment facilities by establishing standard diagnostic, treatment and referral protocols.
5. Enhancing preparedness by improving infrastructure, procurement of logistics, training and conducting Nipah mock drills.
6. Involvement of private sector and inter sectoral coordination.

Activity log

1.Health literacy through behavioural change communication

Target group	By whom	Activity	Frequency
General population	Health care providers and community volunteers JHI JPHN ASHA Anganwadi worker, kudumbasree	Health education sessions Distribution of IEC materials	Monthly-December to June
	Through mass media campaigns	Creation of IEC materials, role plays, drama TV, folklore Newspaper, FM messages, whatsapp messages	December to June
School and college students	Health clubs, with the help of JHI,JPHN	Health education and distribution of IEC materials	December to March
High risk groups			
Hospital staff	Doctors, staff nurses, ICN's	Classes, seminars	Monthly December to June
Occupational high risk groups Fruit vendors, Veterinary staff, hunters, trekkers, wild life enthusiasist, toddy collectors, animal/ pet traders, forest guards, tribal population	Field staff, food safety personals,	Health education class and IEC materials	Monthly-December to June

2.Strengthening of infection control

Infection control	Activity	By whom
Individual and community level	Cough and sneeze hygiene Hand washing Personal hygiene Food and Environmental hygiene Quarantine	General public, Individuals with respiratory symptoms, household members, caregivers
Primary level health carecentres	Airborne infection control desk(cough corner) Hand washing Isolation	Patients with respiratory symptoms, Doctors, Staff nurses, lab technicians, pharmacists and other health care providers
Secondary level heath care centres	Airborne infection control desk(cough corner) Hand washing Isolation Early referral Infection prevention and control practices	Patients with respiratory symptoms, Doctors, Staff nurses, lab technicians, pharmacists, ambulance drivers and other health care providers
Tertiary care hospitals and medical colleges	Airborne infection control desk(cough corner) Hand washing Red channeling of suspected nipah patients Isolation Trainings Mock drills Infection prevention and control practices	Patients with respiratory symptoms, Doctors, Staff nurses, lab technicians, pharmacists, students trainees, ambulance drivers and other health care providers

3.Strenghthening reporting and surveillance

Level	What	By whom	To whom	Action
Individual/Community	Unusual cases or clustering of similar cases	General public	Field staff, ASHA worker	Verification and preliminary report(FIR) by Medical officer to IDSP immediatel y
Hospitals	Suspected/ confirmed Nipah case	Doctor	DMO DSO Regional PEID Cell	1.Report to DHS, State IDSP, State PEID cell 2.Contact tracing 3.RRT
Laboratory	Sample collection, packing, transportation	Doctor/laboratory technician	DSO	Transport of specimen to NIV

4.Inter-sectoral co-ordination

Sector	Airborne infection control	Screening	Health education	Surveillance
Health	✓	✓	✓	✓
Animal husbandry			✓	✓
Forest and Wild life department			✓	✓
Foreign affairs		✓	✓	✓
Environment			✓	
Education			✓	
Food safety			✓	
Food and agriculture			✓	

Kerala Nipah Virus Mock Drill (Functional Exercise)

Background

Post outbreak of NIPAH in June 2019, it was discussed to ensure preparedness for any such future outbreak. The resource group discussed various aspects and drafted an elaborate mock drill protocol.

It is worth noting that Kerala Health has taken it very seriously and included all necessary PPE in their procurement plan in September 2019, placed orders, continued discussions and later drafted mock drill plan.

Why Simulation Exercises

Simulation exercises are tools used to assess and enhance preparedness of the system to face public health threats.

There are five types of simulation exercises:

1. Table-top exercises
2. Mock drills
3. Functional exercises
4. Field exercises
5. Full scale exercises

This document explains the organisation and conduct ***of a functional exercise using a NIPAH virus patient to assess preparedness of health care facilities, public health machinery and laboratory network.***

EXERCISE NAME: Kerala Nipah virus Drill

DATE : A fixed day will be decided to do drill annually

TYPE OF EXERCISE: Functional exercise

LOCATION: Selected health care institutions in Kerala- Primary health centres, Taluk Hospitals, General Hospitals, Medical College Hospitals

PRE-REQUISITES:

- Identify the human resource(HR) to be involved in the functional exercise (hospital superintendents, RMOs, doctors, head nurses, staff nurses, link nurses/infection control nurses, house keeping units, nursing assistants, lab technicians,
  store superintendents/pharmacists, grade 1 and 2 attendants, security staff, lift operators, ambulance drivers, ambulance technicians)
- Training of HR for disaster response

- Procurement of logistics (PPEs, drugs, disinfectants)
- Infrastructure upgradation (e.g: identify/set up isolation rooms in the casualty/OPD, red channels, isolation ICU)
- Designated laboratory network for testing highly infectious samples
- Case definitions, Risk stratification (checklists)

ASSUMPTIONS:

The following are the assumptions to ensure that the exercise is as realistic as possible. Events taking place during the exercise are intended to progress in a logical and realistic manner and all exercise objectives will be achieved throughout the course of exercise.

- Exercise players/participants know well their roles and responsibility during the mock drill and they should act
- in accordance with existing plans, policies and procedures.
- Real-world response actions will take priority over exercise actions.
- The exercise controller (patient-actor) will present him or herself in a manner consistent with symptoms of NIPAH virus and relevant travel history.
- Symptoms described by the controller may require some medical evaluation for triage purposes, but will not require other invasive procedures or medication administration.

PURPOSES:

1) To assess the ability of Health care institutions to promptly and safely identify and isolate a potential patient with NIPAH virus infection
2) To assess the ability of health machinery of Kerala to initiate and implement public health measures for identification and containment of a possible outbreak
3) To assess the health system preparedness for timely and safe collection and transport of NIPAH virus specimens to a designated laboratory

SCOPE:

Duration: The drill is an un-announced exercise planned for a day. (It can be appropriately worked out maximum 2 hours at the hospital facility and 3 hours for the field activities)

Health facility:

1. Primary health centre/CHC/ Taluk Hospital

   Beginning point: Exercise begins when the patient-actor enters

the out-patient department (Eg: household contacts of positive NIPAH virus infection turns symptomatic)

End point: District health authorities are notified and patient is shifted safely to an ambulance for transfer to a designated NIPAH treatment facility.

Community level action to be taken by primary health care centre

Beginning point: Received notification from health facility about suspected NIPAH virus case.

End point: Initiation of contact tracing for hospital and community contacts, and risk stratification.

2. Designated NIPAH treatment centre

Beginning point: Receiving information regarding the arrival of suspected NIPAH virus infection

End point: Admission of patient with suspected NIPAH virus infection in isolation ward and arrangements for sample collection.

Laboratory preparedness at the designated NIPAH treatment facility

Beginning point: Clinician orders lab investigations

End point: Safe transportation of samples to designated diagnostic facility for NIPAH virus

The sequence of events can be represented by the following flow diagram:

OBJECTIVES:

I. Health care facility

1. Determine the time it takes for the facility to identify the potential NIPAH virus disease and initiate mitigation measures in the OPD/casualty area (mask, shifting to isolation, inform trained ambulance team if needed)
2. Identify the time taken for the patient to be transferred to an isolation room.
3. Assess staff adherence to key infection control measures.
4. Determine facility capability to make necessary communications within PHC, trained ambulance team, designated NIPAH treatment centre and district/local health authorities.
5. Determine the capability of the hospital staff and ambulance team to safely shift the patient into the ambulance for transport to designated NIPAH treatment centre, if needed.

II. Health services (Public health aspect)

1. To test the efficacy of communication system within the health system to allow smooth flow of information throughout the chain of command within the health services
   - DMO Regional/State PEID Cell Setting up a team for epidemiological investigation
   - DMO Local health authorities(MO) Community health workerscommunity
   - DMOHealth facility in which patient is admitted(Public/Private)

1. To test the ability of the epidemiological investigation team to effectively initiate the process of tracing contacts based on existing case definitions and risk stratification of contacts
2. To assess the preparedness of system to effectively handle the sensitive health information

III. Laboratory network (Collection and transport of NIPAH virus specimens to designated lab)

1. To assess the preparedness of clinical and para-clinical staff to safely collect required samples for testing.
2. To assess the ability of the system to safely transport the collected samples to a designated laboratory.
3. Adherence of clinical and para-clinical staff to Infection Control Precautions throughout the process of collection and transport of specimens.

SCENARIOS

Patient (or cluster of patients) presenting with symptoms consistent with NIPAH virus, that will require isolation, shifting to a higher centre and notification of district health authorities, initiation of contact tracing and collection and transport of specimens to a designated laboratory.

Scenario 1:

Anju, 23 years presents to a PHC OPD/casualty in village X, with fever of 2 days duration, dry cough. She has developed dyspnoea, over last one day. She is a medical student studying in Wuhan Medical University in China. One week back she returned from china where there was epidemic of NIPAH virus infection along with 3 friends.

Scenario 2

Savithri, 50 years presents to medical college casualty with fever and

dry cough and dyspnoea of 2 days duration, her 25 year old son Sabu was admitted the previous day in an ICU with fever of one week, cough and breathing difficulty. He was suspected to have a NIPAH virus infection. She had cleaned his sputum and helped take him to the hospital without using appropriate protective measures.

Scenario 3:

Chacko, 23 an intern in medical college, presents to the medical casualty of a private tertiary care hospital with fever, dry cough, of 1 day duration. One week back he had received a patient, in the medical college ICU and had taken a detailed history from him. During the time, the patient was coughing and Chacko was not wearing a mask. Sabu was subsequently diagnosed to have NIPAH virus.

Scenario 4:

Robert 29, presents to OPD with high-grade fever and cough of 2 days duration. He recently returned from Singapore.

PARTICIPANTS

The following are the categories of participants involved in the exercise:

1.Exercise director:

The person who provides strategic oversight and direction for the planning, conduct and evaluation of an exercise. The exercise director is responsible for approving the exercise's purpose, objectives and supporting documentation, including the concept note, exercise plan and exercise instructions.

2. Exercise controller/lead facilitator:

A single person who supervises the overall conduct of the exercise, ensuring that it proceeds as planned and that its objectives are reached. The exercise controller is required for drill, functional and full-scale exercises. The exercise director appoints the exercise controller.

3. Patient-actor/s:

The mystery NIPAH virus patient appointed to present in the OPD with history and symptoms consistent with a pre-written scenario. The patient-actor reserves the right to terminate the exercise at any point if he/she has safety concerns or due to real world events that might interfere with the exercise. He will assist in the evaluation wherever practical and will do so in a manner that maintains anonymity of the drill.

4. Evaluator:

The evaluator's job is to evaluate the drill based on the exercise objectives and evaluation guidelines. Evaluator co-ordinates with the trusted agent and is present at the facility throughout the exercise. He keeps the patient actor in view as far as possible without interfering in the drill process. Evaluator collects data about the exercise and exercise objectives and drafts an After – Action Report for feedback to the facility within one week of the drill.

5. Trusted Agent:

Trusted agent is a staff of the facility who serves as a point of contact from the facility. Trusted agents are also placed in the offices of the health department and field. He will receive information regarding the date and time of the drill. In turn, the trusted agent provides information to the drill organisers about any unique considerations that should. Trusted agent also reserves the right to terminate the drill if it seems appropriate at any point in time. Trusted agents from the field initimate the evaluator on the time stamps of activities at field level via text message.

6. Players:

- *Health facility:*Players are the front-line staff of the facility on duty in the OPD at the time of the exercise. They are responsible for identification, isolation, medical care (including sample collection) and reporting of the NIPAH virus case. Players will be evaluated based on the objectives, by the evaluator.
- *Health services:* Administrators (top down from DMO), Administrative and field staff of concerned PHCs, PEID cell team including epidemiologists

ROLES AND RESPONSIBILITIES OF EXERCISE PARTICIPANTS IN DESIGNATED NIPAH TREATMENT CENTE

Superintendent

a) Over all Co-ordination of the operation
b) Checks with all Operational Chiefs
c) Give necessary instructions to all operational Chiefs & collect present status of the operation
d) Know about the number of patients brought to the hospital.
e) Collect all data's about the patients & solve all queries.

f) Communicate with the neighbouring hospitals, if needed

PEID cell coordinators of Medical Colleges

a) Know about the number of patients brought to the hospital & Collect all data about the patients
b) Communicates with the Superintendent.
c) Co-ordinates with the Superintendent regarding the requirements of treating officers (OT/ CSSD/Bed availability in ICU and ward)

Operation Chief Clinical- HOD , Infectious Disease

a) Over all in charge of treatment area
b) Know about the number of patients brought to the hospital & Collect all data's about the patients
c) Communicates with the Superintendent.
d) Co-ordinates with treatment officers in treating the patients
e) Co-ordinates with the Operation Administrative Chief regarding the requirements of treating officers.
f) Communicate with the relatives regarding the victim's status and plan of care

Treating physicians

a) Give preliminary care to patients irrespective of the specialty they are
b) Give necessary information regarding the condition to Clinical Chief
c) Give advice regarding further plan of care of the patient you are seeing
d) Write brief note about the patient
e) Write the plan of care on the case sheet immediately after seeing the patient

Nursing superintendent (Officer)

a) Co-ordinates with the Operation Chief Clinical regarding the further care of the patients.
b) Co -ordinates with the Head Nurses regarding mobilization of staff from the floor.
c) Ensure the bed availability of the floor/ ICU.
d) Management of logistics.
e) Coordinate house keeping activities.

Head Nurse/ Staff Nurse in Charge

a) Make sure that the rooms are ready as soon as possible to receive the patients
b) Management of logistics (PPE, hand rub etc) when requested by the concern departments.

c) Help the special NIPAH OP staff whenever requested
d) Discharge the patients immediately in consultation with consultants

Nursing Staff (NIPAH OP/Ward)

a) Carry out the orders of the treating physician
b) Document about the treatment given case sheet / record vitals
c) Co-ordinate regarding the disposition of patients who was seen by the treating physician

NIPAH OP (Reception) in charge

a) Collect the personal details of the patients
b) Register the patients with UHID number.
c) Preliminary assessment and history taking
d) Directing the patients to treating physician
e) Provide IEC regarding NIPAH virus infection to the care taker
f) Emotional Support to the patient and family

Radiology

b) Call the radiologist and inform

Biomedical Engineering

a) Arrange necessary equipment to the treatment area.
b) Mobilize equipment from floor if needed. (Portable X Ray, Ventillators)
c) Help in arranging treatment area.

Housekeeping

a) House Keeping in charge should see that sufficient staff is present to maintain the cleanliness of the treatment area
b) Waste disposal of the treatment area is carried out frequently to avoid over flow spillage
c) Help the staff whenever they request

Chief Security

a) Arrange Vehicle and driver on standby to collect staff, volunteers, blood, suppliers, or transfer patients to other hospitals
b) Keep lifts working
c) Check security guards are in their correct positions

ROLES AND RESPONSIBILITIES OF EXERCISE PARTICIPANTS IN PHC/CHC/TALUK HOSPITALS

Medical officer in charge

a) Notify District health authority regarding the case of NIPAH virus infection.
b) Arrange designated ambulance service to transport the patients to

designated NIPAH treatment centre.

c) Take relevant history from the patient.

Staff nurse

a) Take detailed history from the suspected NIPAH virus including phone numbers.

b) Arrange a temporary isolation facility till the ambulance arrives.

c) Shift the patient to ambulance and give proper instructions

Health supervisor/Health Inspector/Junior Health Inspector

a) Collect details from staff nurse and initiate contact tracing and risk stratification

b) Provide IEC materials

EXERCISE CONDUCT

Healthcare facility:The exercise evaluator will make initial contact with the trusted agent once on-site at the facility. The trusted agent will accompany the evaluator to the OPD/emergency department where they will remain for the duration of the exercise .In order to avoid undue suspicion, the exercise evaluator may assume the role of a vendor, consultant or colleague of the trusted agent that is viewing the emergency department for reasons unrelated to the drill. Once in the emergency department, the evaluator will instruct the exercise controller via cellphone to enter the emergency departmentandbeginthedrill.

The patient-actor will enter the facility's emergency department upon notification from the evaluator that it is appropriate to do so. The patient-actor will play the role of the patient presenting with symptoms consistent with any of the given exercise scenarios. The patient-actor will collect any data possible during the course of exercise play; it is recommended to take notes and mark time stamps on a mobile device, however, it is acknowledged that taking notes may not be feasible given the unannounced nature of the drill. If possible, there should be a plan for the controller to communicate key time stamps to the evaluator as they occur (e.g. via text) wheneverpossible.

In the health care facilities, the trusted agent will not be expected to collect data other than any qualitative information that may be captured during the hot wash.

Field activities: Key time stamps are also communicated to the evaluator by trusted agents at each point of communication in the health department, PEID Cell and field via text message.

General rules that govern exercise play:

- Real-world emergency actions take priority over exercise actions.
- Exercise participants will comply with real-world response procedures, unless otherwise directedby the exercise controller.
- Although these drills are unannounced, a trusted agent at each facility will coordinate activities with the exercise controller to ensure that all applicable safety and security provisions are followed.
  - The trusted agent will retain the right to terminate the exercise if at any point they feel it is appropriate.
- At no point should the controller allow facility staff to perform any invasive procedures or administer any medications.
  Theexercisecontrollermayterminatethedrillatanypointthatheorshefeelsitisappropriategiven the actions being taken by facility staff, these may include (but shall not be limited to):
  - Notification to local media outlets of a possible communicabledisease
  - Administering medications based on the controller's reportedsymptoms
  - Performing invasive procedures, such as giving IV fluids, based on the controller's reported symptoms
  - Evacuation or movement of patients in portions of the emergency department or other actions that may otherwise compromise the care of other patients in the emergency department

The exercise is followed by a de-briefing activity by the drill team involving all participants

Example:

ONCE THE PATIENT ARRIVES IN DESIGNATED NIPAH TREATMENT CENTRE

Person in charge of NIPAH OP after wearing PPE must take detailed history from the patient & make arrangements for consultation with treating physician.

Consider admitting the patient in accordance with the opinion of treating physician.

Arrange a staff with PPE to accompany the patient.

Clear the way to admission room and shift the patient to alert room already arranged for admission (CCU &Deluxe pay ward).

AFTER ADMISSION

- Examine the patient in detail after taking all the necessary precautions (PPE).
- Instruct all the staff involved in dealing with patient to follow necessary infection control practices strictly (especially PPE, Hand hygiene).

- In case of investigations/scanning/X-ray, inform the Labs/ Centre before sending samples for taking precautions.
- Instruct them to wear PPE during investigation.

DURING SAMPLE COLLECTION

Sample to be collected as early as possible, in an isolated room with all biosafety precautions.

Samples should be sent along with the Performa obtained from testing laboratory containing the detailed history of patient.

Sent to the concerned lab after triple layer packing.

During sample collection

Wear complete disposable PPE.

Follow strict hand hygiene practices.

Inform security officer to arrange an ambulance for sending the sample.

WASTE MANAGEMENT

Discard all waste except needles in labelled yellow covers.

Needles in white containers (as directed by IMAGE).

Hose keeping wing should ensure the cleanliness of treatment area.

DEBRIEFING/ HOTWASH QUESTIONS:

What actions did you take? Who, if anyone, did you notify? What would your next steps have been? Is there anything you would have done differently, and why? How could this drill be improved? Did you know, or suspect, that this was a drill? Did you find this drill valuable?

EVALUATION

Evaluation of these drills will beperformedbyboththeexerciseevaluator and the patient-actor.Indoingso,datacollectedduring the course of exercise play will be as complete as possible even though the evaluator and actor may becomeseparatedthroughoutthecourseofthedrill.

The evaluator will collect all data possible in the Exercise Evaluation Guide (EEG); however, it is expected that this may not be possible should the patient-actor be moved out of view by clinical staff for further evaluation and/orisolation.Thepatient-actor shouldassist the evaluator in filling the evaluation guide followingthecompletionofthedrill, forincorporationintothe After Action Report

KERALA NIPAH VIRUS DRILL - EXERCISE EVALUATION GUIDE

Health care centre:

Controller:		Date:	
Evaluator:		Scenario:	
Patient-actor/s:		Start Time:	
Trusted Agent:		End time	

Key measures	Time stamp
Time patient entered the Special NIPAH OPD.:	
Time patient received by the staff in charge of NIPAH OP:	
Time brought to the treating physician:	
Time patient dons mask (or other source control measure is initiated):	
Who gave the patient a mask? ☐ By-stander? ☐ Attender ☐ Nurse ☐ Physician ☐ Other:	
Was this the first clinical staff member the patient came into contact with? ☐ Yes ☐ No ☐ Unsure ☐ Not applicable (patient not given amask)	
If other initial source control measures were taken besides masking, please specify:……	
Time the patient is moved to isolation room:	
Time facility's Infection Control is notified:	
Time ambulance team is called (if needed): (For PHC/CHC/Taluk Hospitals only)	
Time Health department is notified:	
Time for PEID cell to be notified:	
Time for local PHC and field staff to be notified:	
Time of formation of an epidemiological investigation team:	

Risk Screening Questions			
Was the patient asked if they had a fever ?	☐	☐	☐
Was the patient asked for history of dry cough			
Was the patient asked about the presence of dyspnoea?	☐	☐	☐
If the patient reported a fever, was he asked if someone close to them had a similar illness/admitted else where/ died?	☐	☐	☐
If the patient reported fever, travel to NIPAH virus affected area/ contact with suspected NIPAH virus case	☐	☐	☐
Infection Control Questions			
Are masks visible and available to patients in the NIPAH OP?	☐	☐	☐
Are hand hygiene supplies visible and available in the patient NIPAH OP?	☐	☐	☐
Was the suspected patient given a mask and appropriate instruction?	☐	☐	☐
Was hand hygiene performed by all staff who came in contact with patient?	☐	☐	☐
Was the patient instructed to perform hand hygiene after coughing or after coming in contact with respiratory secretions ?	☐	☐	☐
Were other staff notified of a possible suspect patient?	☐	☐	☐
Was Infection Control notified?	☐	☐	☐
Isolation questions			
Is the designated isolation room available?	☐	☐	☐
Was the patient placed in Isolation Room ?	☐	☐	☐
Was appropriate Infection Control signage posted for the isolation room?	☐	☐	☐
Did all staff entering the isolation room don the correct PPE (including mask, gloves and gown if indicated)?	☐	☐	☐
Were PPE supplies readily available near the isolation room entrance?	☐	☐	☐
Did the provider wash/sanitize hands after patient encounter?	☐	☐	☐
Sample collection and transport questions			
	☐	☐	☐
Was adequate equipment available for collection and transport of specimens?	☐	☐	☐
Was a laboratory/laboratories designated for NIPAH virus diagnosis?			
Was the institution aware about the designated laboratory facility/facilities for NIPAH virus diagnosis?	☐	☐	☐
Was infection control precautions followed while collection, labeling and transport of samples?	☐	☐	☐
Were the samples labelled appropriately about the biohazardous nature of specimen?	☐	☐	☐
Was the designated laboratory/laboratories informed via phone about the possible NIPAH virus case?			
Field activities questions	Y	N	NA
Was there any delay in communicating the information down the chain of communication up to the field staff?			
Was there any confusion regarding individual roles and responsibilities?			
Was the case definitions and checklists for classifying the contacts according to risk readily available as soft copies/online?			
Was the epidemiological investigation team prompt in initiating contact surveillance?			
Was a media spokesperson identified?			

TARGET TIMES:

Time taken for the following should be calculated by the evaluator from the time stamps collected. This should be compared with a set target time:

1. Patient arrival at health facility other than designated NIPAH treatment centre Designated NIPAH treatment centre
2. Patient arrival in NIPAH OPD patient provided mask
3. Arrival of the patient to special NIPAH OP Treating physician's consultation
4. Physician's consultation patient shifted to isolation room
5. Diagnosis of probable NIPAH virus initiation of contact tracing
6. Diagnosis of probable NIPAH virus collection and transportation of samples

AFTER-ACTION REPORT (AAR)

Within 2 weeks, the drill team has to submit an AAR to the health facility, health department and field staff regarding the success of the procedures, gaps identified and corrective measures to be taken. Corrective measures to be taken in terms of HR, training, equipment, infrastructure and policy should be identified and communicated through the AAR. This action plan should be disseminated among all participants of the drill and should lead to meaningful discussions and actions on further improvement.

References:

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The Health department has published the Standard Operating Procedure to tackle NIPAH outbreak. A multidisciplinary resource group was constituted involving senior faculties from Directorate of Medical Education and field officers from Directorate of Health Services.

These guidelines could be drafted with wholehearted efforts of all the doctors of the resource group and others from the PEID Cells and the doctors from the field. We earnestly appreciate their contribution.

Kerala Health

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4.	Dr Aravind	Asst Professor, Deptt of Infectious Diseases MCH Thiruvananthapuram
5.	Dr Binu Areekkal	Associate Professor, Community Medicine, MCH Thrissur
6.	Dr Meenakshy	Addl Director Health Services
7.	Dr Mathew	DPM Ernakulam
8.	Dr Naveen	DPM Kozhikode
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Kerala HEALTH