

Nipah & Oral Healthcare – “A Time to Reevaluate our Infection Control Practices”

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Abstract

Review Article

Nipah virus (NiV) is a deadly virus with a high mortality rate that has affected many developing countries in the past. According to the Centre for Disease Control (CDC), many economically deprived countries are at high risk for future outbreaks. Almost two decades after the first NiV case was reported little scientific progress has been made in finding a proper treatment and prevention vaccine. As many developing countries are not properly equipped to fight the infection, it is vital to properly educate the health systems. The goal of an infection control program is to provide a safe working environment for dental health care personnel and their patients. It is crucial for all dental practitioners to be up to date on current Centres for Disease Control (CDC) and Prevention guidelines, equipment, and techniques for proper infection control. Continuous evaluation of infection control practices is important, this ensures the patients and enables the dental healthcare providers confidence that oral health care can be delivered and received in a safe and effective manner. As dentists are one of the health care professionals who work very closely with their patients, the article aims to provide an epidemiological background as well as to understand the transmission routes, presentation, diagnosis and prevention of this deadly virus and precautions to be taken by dental health care personnel.

Keywords: Nipah virus, Zoonosis, Henipa virus, Infection Control, Dentistry, Occupational Hazard.

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INTRODUCTION

The first case of Nipah virus (NiV) infection was initially reported in late September 1998 near Ipoh, West Malaysia. Over the months that followed, several clusters of infections were noted over different regions such as near Sikamet and Bukit Pelandok[1]. The cases were primarily assumed to be Japanese B Encephalitis and four patients were tested positive for the virus. However, the assessed victims were adults and not children, and there were reports of sick pigs with a barking cough, many of which died as well. These two features were not typical of Japanese B Encephalitis [2,3].

What is Nipah?

Nipah virus (NiV) is a member of the family Paramyxoviridae, genus Henipavirus. NiV was initially isolated and identified in 1999 during an outbreak of encephalitis and respiratory illness among pig farmers and people with close contact with pigs in Malaysia and

Singapore [4]. Its name originated from Sungai Nipah, a village in the Malaysian Peninsula where pig farmers became ill with encephalitis [5]. Given the relatedness of NiV to Hendra virus, bat species were quickly singled out for investigation and flying foxes of the genus Pteropus were subsequently identified as the reservoir for NiV[4].

Risk of Exposure

Infected bats shed virus in their excretion and secretion such as saliva, urine, semen and excreta but they are symptomless carriers. The NiV is highly contagious among pigs, spread by coughing. Direct contact with infected pigs was identified as the predominant mode of transmission in humans when it was first recognized in a large outbreak in Malaysia in 1999[6].

More than 23 species of bats have been identified as possible reservoirs of NiV. Several species have served as host for the virus and these include

naturally infected dogs, horses, pigs, cats, and humans [7, 8].

Transmission to humans involves either direct bat-to-human transmission or from bats to human through an intermediate animal host. Human-to-human transmissions have also been reported in several outbreaks such as in Bangladesh and India [9,10].

Clinical Presentation

Symptoms of NiV infection in humans are similar to that of influenza such as fever and muscle pain. In some cases, inflammation of the brain occurs leading to disorientation or coma. Encephalitis may present as acute or late onset. The latter may be difficult to diagnose since exposure may have taken place several months earlier. Further, those who may have recovered from an acute episode may also have a relapse. The case fatality rate ranges from 9 to 75%. And the incubation period is from 4 to 40 days [11,12].

Diagnosis & Treatment

Procedures for the laboratory diagnosis of NiV include serology, histopathology, PCR and virus isolation. Serum Neutralization Test, ELISA, RT-PCR are used for laboratory confirmation [13].

There is currently no vaccine against NiV. The treatment options for patients with NiV include mostly supportive care. Chong *et al.* have reported a lower mortality rate with ribavirin therapy. The mortality rate has varied greatly in different outbreaks [14].

Prevention

The main aim of NiV management should focus on prevention. It is vital to properly educate the at-risk populations about the means of transmission of the virus. Domestic animals should not be allowed to eat fruits that have been exposed to bats. Raw palm sap is also a possible source of infection and consumption should be avoided to reduce the risk of bat-to-human transmission.

Proper precautions, protective clothing, and gloves ought to be used while handling any sick or dead animals or patients. With the current epidemic in Kerala, India, the National Centre of Disease Control of India has strongly advised strict and proper hand hygiene after coming into contact with any sick person or animal by using soap and water. They also advised against the consumption of raw palm sap or toddy. People were warned against eating half-eaten fruits, entering abandoned wells, and to properly handle dead bodies [15].

In January 2017, international governments and pharmaceutical companies formed the Coalition for Epidemic Preparedness Innovations (CEPI) to fund and promote research for a safe, affordable, and effective vaccine against the disease [12].

In Dentistry

Dental professionals and auxiliary staffs are one among the health care providers who work very closely with their patients. Most procedures performed by the dental team have the potential for creating contaminated aerosols and splatter. Bacterial diseases, viral infections and other skin infections are caused by the microorganisms which were isolated in dental aerosols [16].

Even though no case of Nipah spread through dental aerosols or through human spread are reported, universal precautions has to be taken by dental professionals and auxiliaries for self-protection and spread of infections during such outbreaks in their nearby areas[17].

Like any other health care professional, dentists have to inform the public about the facts regarding NiV infection and try to reassure them.

When in doubt perform only those treatments which are of emergency and delay elective procedures to a later date. Restrict the number of people entering to the operating room. Hand hygiene measures have to be performed thoroughly and frequently. Dentists should also avoid touching eyes, ears and mouth before performing the hand hygiene measures [18].

While performing the procedures try to minimize the contact with the operating field and follow the proper gloving techniques. Always follow the proper use of barrier techniques and disposal of the used material. Try to avoid the close contact with the patients and use triple layered mask or N95 masks for the dentists and the assistants during the time of reported outbreak [19].

Routine hand washing with commercially available medicaments has to be done before putting on a mask and avoid touching them after wearing. Change the surgical masks frequently and properly dispose them. Protective eye wears should also be used while doing any procedure to avoid aerosol contact [20].

The unique nature of dental procedures, instrumentation and patient care settings require specific strategies directed to the prevention of transmission of diseases among dental health care workers and their patients or vice versa. The risk of infectious disease transmission is an inherent part of dental practice. Fortunately, such risks can be greatly reduced through modern infection control practices. Such practices include the use of various measures, including administrative, engineering, and work practice controls. The guidelines enumerated in this article has been adapted and tailored by the authors from the existing literature developed by CDC, Occupational and Safety Health Administration

(OSHA) and other previously published document by the Department of Health Infection Control Committee, India [21,22].

Administrative Recommendations for Dental Settings[21-23].

- Develop and maintain infection prevention and occupational health programs.
- Provide supplies necessary for adherence to Standard Precautions (e.g., hand hygiene products, safer devices to reduce percutaneous injuries, personal protective equipment).
- Assign at least one individual trained in infection prevention responsibility for coordinating the program.
- Develop and maintain written infection prevention policies and procedures appropriate for the services provided by the facility and based on evidence-based guidelines, regulations, or standards.
- Facility has system for early detection and management of potentially infectious persons at initial points of patient encounter.

Education and Training in Dental Settings:[24]

- Provide job- or task-specific infection prevention education and training to all Dental Health Care Personnel (DHCP).
- Provide training on principles of both DHCP safety and patient safety.
- Provide training during orientation and at regular intervals (e.g., annually or semi-annually).
- Maintain training records according to state and council requirements.

Dental Health Care Personnel Safety[25,26,27,28,29,30]

- Current CDC recommendations for immunizations, evaluation, and follow-up are available. There is a written policy regarding immunizing DHCP, including a list of all required and recommended immunizations for DHCP [e.g., hepatitis B, MMR (measles, mumps, and rubella) varicella (chickenpox), Tdap (tetanus, diphtheria, and pertussis)].
- All DHCP are to be screened for tuberculosis (TB) upon hire regardless of the risk classification of the setting.
- Referral arrangements should be in place to qualified health care professionals to ensure prompt and appropriate provision of preventive services, occupationally-related medical services, and post-exposure management with medical follow-up.
- Facility should have well-defined policies concerning contact of personnel with patients when personnel have potentially transmissible conditions.

Program Evaluation in Dental Settings

Establish routine evaluation of the infection prevention program, including evaluation of DHCP adherence to infection prevention practices.

Hand Hygiene in Dental Settings:[31,32,33,34,35,36]

- Perform hand hygiene — when hands are visibly soiled, after barehanded touching of instruments, equipment, materials, and other objects likely to be contaminated by blood, saliva, or respiratory secretions, before and after treating each patient and before putting on gloves and again immediately after removing gloves.
- Use soap and water when hands are visibly soiled (e.g., blood, body fluids); otherwise, an alcohol-based hand rub may be used.

Personal Protective Equipment (PPE) in Dental Settings: [37, 38, 39, 40, 41]

- Provide sufficient and appropriate PPE and ensure it is accessible to DHCP.
- Educate all DHCP on proper selection and use of PPE.
- Wear gloves whenever there is potential for contact with blood, body fluids, mucous membranes, non-intact skin or contaminated equipment. Do not wear the same pair of gloves for the care of more than one patient. Do not wash gloves. Gloves cannot be reused. Perform hand hygiene immediately after removing gloves.
- Wear protective clothing that covers skin and personal clothing during procedures or activities where contact with blood, saliva, or OPIM is anticipated.
- Wear mouth, nose, and eye protection during procedures that are likely to generate splashes or spattering of blood or other body fluids.
- Remove PPE before leaving the work area.

Respiratory Hygiene / Cough Etiquette in Dental Settings [22,25,42,43]

- Implement measures to contain respiratory secretions in patients and accompanying individuals who have signs and symptoms of a respiratory infection, beginning at point of entry to the facility and continuing throughout the visit.
- Post signs at entrances with instructions to patients with symptoms of respiratory infection to —
 - Cover their mouths / noses when coughing or sneezing.
 - Use and dispose of tissues.
 - Perform hand hygiene after hands have been in contact with respiratory secretions.
- Provide tissues and no-touch receptacles for disposal of tissues.
- Provide resources for performing hand hygiene in or near waiting areas.

- Offer masks to coughing patients and other symptomatic persons when they enter the dental setting.
- Provide space and encourage persons with symptoms of respiratory infections to sit as far away from others as possible. If available, facilities may wish to place these patients in a separate area while waiting for care.
- Educate DHCP on the importance of infection prevention measures to contain respiratory secretions to prevent the spread of respiratory pathogens when examining and caring for patients with signs and symptoms of a respiratory infection.

Safe Injection Practices in Dental Settings:[30,31,43]

- Prepare injections using aseptic technique in a clean area.
- Disinfect the rubber septum on a medication vial with alcohol before piercing.
- Do not use needles or syringes for more than one patient (this includes manufactured prefilled syringes and other devices such as insulin pens).
- Medication containers (single and multi-dose vials, ampules, and bags) are entered with a new needle and new syringe, even when obtaining additional doses for the same patient.
- Use single-dose vials for parenteral medications when possible.
- Do not use single-dose (single-use) medication vials, ampules, and bags or bottles of intravenous solution for more than one patient.
- Do not combine the leftover contents of single-use vials for later use.
- The following apply if multi-dose vials are used —
 - Dedicate multi-dose vials to a single patient whenever possible.
 - If multi-dose vials will be used for more than one patient, they should be restricted to a centralized medication area and should not enter the immediate patient treatment area (e.g., dental operator) to prevent inadvertent contamination.
 - If a multi-dose vial enters the immediate patient treatment area, it should be dedicated for single-patient use and discarded immediately after use.
 - Date multi-dose vials when first opened and discard within 28 days, unless the manufacturer specifies a shorter or longer date for that opened vial.
- Do not use fluid infusion or administration sets (e.g., IV bags, tubing, connections) for more than one patient.

Sterilization and Disinfection of Patient-Care Devices for Dental Settings[37,42,43,44]

- Clean and reprocess (disinfect or sterilize) reusable dental equipment appropriately before use on another patient.

- Clean and reprocess reusable dental equipment according to manufacturer instructions. If the manufacturer does not provide such instructions, the device may not be suitable for multi-patient use.
- Have manufacturer instructions for reprocessing reusable dental instruments / equipment readily available, ideally in or near the reprocessing area.
- Assign responsibilities for reprocessing of dental equipment to DHCP with appropriate training.
- Wear appropriate PPE when handling and reprocessing contaminated patient equipment.
- Use mechanical, chemical, and biological monitors according to manufacturer instructions to ensure the effectiveness of the sterilization process.
- Maintain sterilization records in accordance with state and council regulations.

Environmental Infection Prevention and Control in Dental Settings[43, 44]

- Establish policies and procedures for routine cleaning and disinfection of environmental surfaces in dental health care settings.
- Use surface barriers to protect clinical contact surfaces, particularly those that are difficult to clean (e.g., switches on dental chairs, computer equipment) and change surface barriers between patients.
- Clean and disinfect clinical contact surfaces that are not barrier-protected with an Environment Protection Agency (EPA)-registered hospital disinfectant after each patient. Use an intermediate-level disinfectant (i.e., tuberculocidal claim) if visibly contaminated with blood.
- Select EPA-registered disinfectants or detergents / disinfectants with label claims for use in health care settings.
- Follow manufacturer instructions for use of cleaners and EPA-registered disinfectants (e.g., amount, dilution, contact time, safe use, and disposal).

Dental Unit Water Quality in Dental Settings [41,42]

- Use water that meets EPA regulatory standards for drinking water (i.e., ≤ 500 CFU / mL of heterotrophic water bacteria) for routine dental treatment output water.
- Consult with the dental unit manufacturer for appropriate methods and equipment to maintain the quality of dental water.
- Follow recommendations for monitoring water quality provided by the manufacturer of the unit or waterline treatment product.
- Use sterile saline or sterile water as a coolant / irrigant when performing surgical procedures.

CONCLUSION

Nipah virus is a deadly virus and has been reported in many underdeveloped countries with a high

mortality rate for each outbreak. Two decades after the first reported case, there is still no improvement in treatment options or an effective vaccine. However, with proper education future outbreaks can be prevented and should be the number one priority in combating NiV outbreaks.

The main strategy is to prevent NiV in humans. Establishing appropriate surveillance systems will be necessary so that NiV outbreaks can be detected quickly and appropriate control measures initiated.

Health-care workers caring for patients with suspected or confirmed infection, or handling specimens from them, should practice standard infection control precautions at all times. As human-to-human transmission has been reported, particularly in health-care settings, contact and droplet cross-contamination guidelines should be implemented in addition to all other standard precautions.

Cross contamination can place the dentist at serious risk of contracting serious illness. Practices and policies for extending and expanding oral health care must be based on ethical and safety concerns by persons delivering oral prevention, treatment, and care to patients. Hence, it becomes imperative for dentists to realize that the solution to this risk lies within us. Adopting and practicing standard infection control guidelines in routine dental practice and also prevention and taking the necessary precautions is the basic requirement that can help keep the menace of cross contamination and infection away.

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