

An Invited Editorial Comment for Intensive & Critical Care Nursing

Strengthening ICU health security for a Coronavirus epidemic

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Introduction

Coronaviruses are a large family of viruses causing illness in people and others that circulate among animals (CDC, 2019). The first patient with a novel Coronavirus (nCoV) was first detected in Wuhan City, Hubei Province, China in January 2020. By February 2020, the nCoV has spread around the world, mostly in Asia. Many uncertainties exist, including how easily the nCoV spreads from person-to-person (JAMA, 2020). In addition, there is a limited information available to characterize the spectrum of clinical illness associated with nCoV (CDC, 2019).

Background

On 10 January, the World Health Organization (WHO) published a range of interim guidance for all countries on how they can prepare for nCoV, including how to monitor for sick people, test samples, treat patients, control infection in health centres, maintain the right supplies, and communicate with the public about this novel virus (WHO, 2020a).

This editorial based on WHO's interim infection prevention and control (IPC) guidance and the lessons learned from the previous severe acute respiratory syndrome (SARS) epidemics. Full guidelines are available at Infection prevention and control of epidemic-and pandemic prone acute respiratory infections in health care (WHO, 2014).

Early recognition and source control

Rapid isolation and strict adherence to infection control precautions are critical. Patients who require assessment for acute respiratory infection potentially due to nCoV should be identified rapidly. Suspected and probable nCoV patients should be isolated in a separate area from other patients (source control) to minimize transmission to other (WHO, 2020a).

ICU's capacity is one of the factors that governs the number of nCoV patients a hospital can manage; during the SARS epidemic, approximately 20% of patients with SARS required ICU care (Loufty et al., 2004). Patients with nCoV should be isolated into private, negative pressure rooms (≥ 12 air changes/hour) or adequately ventilated ($\geq 160\text{L}/\text{second}/\text{patient}$) single rooms (WHO, 2020a). Movement and transport of patients outside the ICU should be avoided unless medically necessary. Designated portable X-ray equipment and/or other important diagnostic equipment should be used. If transport is required, pre-determined transport routes should be used to minimize exposures to staff, other patients and visitors, and apply FFP 2/3 mask to patient (WHO, 2005; WHO, 2020a).

Standard precautions

The personnel managing nCoV patients should wear all personal protective equipment (PPE; e.g., face mask [N/R/P 95/88/100 or FFP 2/3 or CE EN 149:2001 or EN 143:2000], single pair of gloves, eye protection, clean, non-sterile, long sleeved fluid resistant gown, apron, and footwear that can be decontaminated) and wash hands before and after contact with any patient, after activities likely to cause contamination and after removing gloves (WHO, 2005). Alcohol-based skin disinfectants should be used if there is no obvious organic material contamination. Disinfectants with appropriate concentrations should be widely available (WHO, 2005).

Particular attention should be paid to interventions, which may disrupt the respiratory tract or place the personnel in close proximity to the patient and potentially infected secretions (e.g., nebulizers, chest physiotherapy, bronchoscopy, tracheostomy, tracheal intubation, endotracheal suctioning, manual ventilation before intubation and bronchoscopy, non-invasive ventilation, cardiopulmonary resuscitation, gastroscopy). In addition, particular attention should be paid to collection and handling of laboratory specimens from patients with suspected and probable nCoV. If the specimen is collected under aerosol generating procedure, the personnel who collect specimens should use appropriate PPE (listed above). During transport, specimens should be placed in leak-proof specimen bags with a separate sealable pocket for the specimen, and a clearly written laboratory request form (WHO, 2020a).

Disposable equipment should be used whenever possible (e.g., stethoscopes, blood pressure cuffs, thermometers). If devices need to be reused, they should be sterilized or and disinfected between each patient use (e.g., ethyl alcohol 70%) (WHO, 2020a). Disposable equipment should be disposed appropriately. Surfaces should be cleaned with broad spectrum disinfectants of proven antiviral activity (WHO, 2005).

It should be ensured that environmental cleaning and disinfection procedures are followed consistently and correctly. Thorough cleaning of environmental surfaces with water and detergent and applying commonly used hospital level disinfectants (such as sodium hypochlorite) is an effective and sufficient procedure. Laundry, food service utensils and medical waste should be managed in accordance with safe routine procedures (WHO, 2020a).

Administrative controls

Administrative controls and policies should include, for instance, establishment of the personnel and patients' care givers education and training; monitoring adherence to standard precautions, along with mechanisms for improvement as needed (WHO, 2020a); provision of appropriate placement of hospitalized patients promoting an adequate patient-to-staff ratio; and surveillance of nCoV (WHO, 2020b).

The effectiveness of the PPE depends on adequate and regular supplies, adequate training, proper hand hygiene, and specifically appropriate human behavior (WHO, 2020a). The personnel and patients' care givers should be trained in the infection control precautions required for the nCoV patients. In addition, a member of staff must be identified

who will have the responsibility of observing the practice of others and provide feedback on infection control (WHO, 2005). A record of all persons entering the patient's room should be maintained (WHO, 2020a). Overall, however, all non-essential staff as well as visitors should be kept to a minimum.

During the epidemic, there will be a need for additional nurses, physicians, radiologists, and IPC teams. During the SARS epidemic, the patient-to-physician ratio was 5 – 10 SARS patients per physician and 20 – 30 SARS patients per infectious disease consultant. In ICUs, two nurse per patient may be needed to establish isolation (Loufty et al., 2004).

Conclusion

Each hospital should be prepared to identify, triage, and manage nCoV patients by (i) calculating the maximum number of beds available for conversion to private (negative-pressure) rooms, (ii) testing the status of negative pressure /air circulation within the rooms, (iii) identifying adequate resources and staff for an effective response and surge capacity, (iv) generating a plan to meet the extra cost of hiring additional personnel, and (v) preparing for intensive training in the use of PPE and infection control precautions (CDC, 2004; Loufty et al., 2004).

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