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A multi-faceted approach of a nursing led education in response to MERS-CoV infection☆

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ABSTRACT

Background: The emergence of the Middle East respiratory syndrome-coronavirus (MERS-CoV) resulted in multiple healthcare associated outbreaks. In response, we developed a nurse-led program to screen and triage patients with MERS-CoV infection.
Methods: A formal educational program was implemented to ensure a standardized approach to care planning and delivery. The essential skills that were included were the use of Personal Protective Equipment (PPE) including gown, gloves, head cover and N95 mask, hand hygiene, the practice of donning and doffing and the collection of MERS-CoV nasopharyngeal specimens.
Results: A core group of nurses were identified from high-risk units. The education program consisted of four skill-days. Nurses were assigned a pre-course work from Mosby's Nursing Skills, an online skill module, donning and doffing of PPE, and the process for obtaining a nasopharyngeal swab. The skill lab incorporated multiple methods such group discussion, watching an on-line video, and a simulated demonstration and practice on a mannequin. In total, 450 nurses attended the Nasopharyngeal Skills Day and 1000 nurses received training. Donning and doffing PPE and N95 mask fit testing has become an annual mandatory competency requirement for staff in nursing and clinical services.
Conclusion: The application of specified protocols minimizes the risks of cross infection, placing emphasis on patient and staff safety as well as expediting the patient to definitive treatment. Nurse educators have an instrumental role in training nurses and other healthcare providers on the specifics needed to identify, contain and manage patient presenting with MERS-CoV.

Introduction

The emergence of the Middle East Respiratory Syndrome Coronavirus (MERS-CoV) in the Kingdom of Saudi Arabia (KSA) in 2012 [1] resulted in multiple healthcare associated infections in Al-Hasa, Jordan, Jeddah, Taif, and the Republic of Korea [2–9]. A coordinated response is necessary to minimize the risks to healthcare providers and other patients. It was found that close contact, such as providing unprotected care to a patient can result in person to person transmission. Simple infection control measures result of the first outbreak in Al-Hasa, KSA [2]. MERS-CoV as other emerging infectious diseases had been associated with fears and anxiety of taking care of patients [10,11]. Thus, we developed a nurse-led program to stream line the screening process and to establish a cohort of healthcare workers to obtain nasopharyngeal swabs for MERS-CoV testing. In this report, we describe the program and highlight its salient components.

Materials and methods

The study was conducted at Johns Hopkins Aramco Healthcare with a multifaceted approach.

Intervention

The hospital response included a review of international guidelines [12–14] and those offered by the Saudi Arabian Ministry of Health [15]. Advice and support was provided by the Infection Control and Prevention Department with regards to disseminating

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Table 1
The skills labs incorporated multiple skills.
(PPE: Personal Protective Equipment)

Skills	Method
PPE Donning and Doffing	Demonstration
Correct use of N 95 mask	Demonstration
Orientation to Laboratory and MOH forms required for nasopharyngeal specimen testing	Discussion
Process for transportation of nasopharyngeal swab to Laboratory for testing	Discussion
Instruction on how to obtain a nasopharyngeal swab	Procedure on-line video obtained from the New England Journal of Medicine [18]
Obtaining a nasopharyngeal swab from a patient	Simulated demonstration and practice on a mannequin — competency assessed

Fig. 1. Nasopharyngeal Training Station: each nurse joined a group where a nurse educator simulated the procedure, using a mannequin.

information and developing processes to assist an interdisciplinary response team. It became obvious that good infection control and prevention practices would be necessary to not only care for patients who had tested positive for MERS-CoV but also for suspected cases and to protect staff in the delivery of the required care. Thus, a new process had to be implemented in order to reduce the risk of transmission of MERS-CoV. The study was approved by the Institutional Review Board.

Education

Staff awareness of MERS-CoV symptoms and initial management was the first step. Screening and subsequent isolation of patients presenting to the Emergency Department or Primary Care with symptoms suggestive of MERS-CoV would reduce the risks of transmission. Alerting staff to the signs and symptoms aimed to increase early recognition of the virus in patients presenting to the hospital. The next stage required a formal educational strategy to ensure a standardized approach to care planning and delivery. Following local and international guidelines [12–14], the Clinical Practice, Education, Research and Education Division (CPERD) commenced the education and training of all nursing staff to ensure competency in caring for patients with actual or suspected MERS-CoV. It was recognized the hospital response would need to include more advanced infection control measures in order to ensure the protection of heath care providers. Recommendations from the CDC included employing standard, contact and airborne precautions which was used to devise the education and training program [12–15]. The essential skills that were included in the program included: the use of Personal Protective Equipment (PPE) including gown, gloves, head cover and N95 mask, hand hygiene, the practice of donning and doffing and the collection of MERS-CoV nasopharyngeal specimens.

Nasopharyngeal Swab Educational Program

Nasopharyngeal swab specimens are used to obtain samples for MERS-CoV testing [16]. Therefore a good technique is essential to ensure that an adequate sample was obtained. It was suggested at that time that lower respiratory tract samples should be obtained for confirmation of the MERS-CoV virus [17]. Lower respiratory samples were obtained whenever this was possible.

Results

A core group was identified from the Emergency Department, Primary Care, the dedicated Isolation Unit, and the Hemodialysis Unit. The education program consisted of four skill-days consisting of one hour rolling sessions. The program was then extended to other wards and units who may admit or take care of MERS-CoV patients. Nurses were assigned a pre-course work from Mosby's Nursing Skills, an online skill module, donning and doffing of PPE, and the process for obtaining a nasopharyngeal swab. The skill lab incorporated multiple methods such as demonstration, group discussion, watching an on-line video obtained from the New England Journal of Medicine [18], and a simulated demonstration and practice on a mannequin (Table 1).

Nurses were re-orientated to the correct process of donning and doffing PPE including N95 mask through a demonstration process. The nurses were then shown a video developed by the New England Journal of Medicine entitled: Procedure – Collection of Nasopharyngeal Specimens with the Swab Technique [18]. Each nurse joined a skills table where a nurse educator simulated the procedure, using a mannequin, to obtain a nasopharyngeal swab (Fig. 1). Special consideration was given to the position of the patient, the depth the swab was to be placed and the length of time the swab was to be in contact with the mucosal surface. The procedure was practiced until all nurses were comfortable with the process. The skills lab also addressed specific requirements outlined by the Prevention and Control of Infection Committee, the hospital Laboratory and the Ministry of Health including the necessary forms (Fig. 2), transportation of the specimens to the Laboratory and the notification requirements.

The reporting forms were revised by the educators to ensure all required components were documented. The process for notifying the hospital Epidemiology and the Ministry of Health was updated

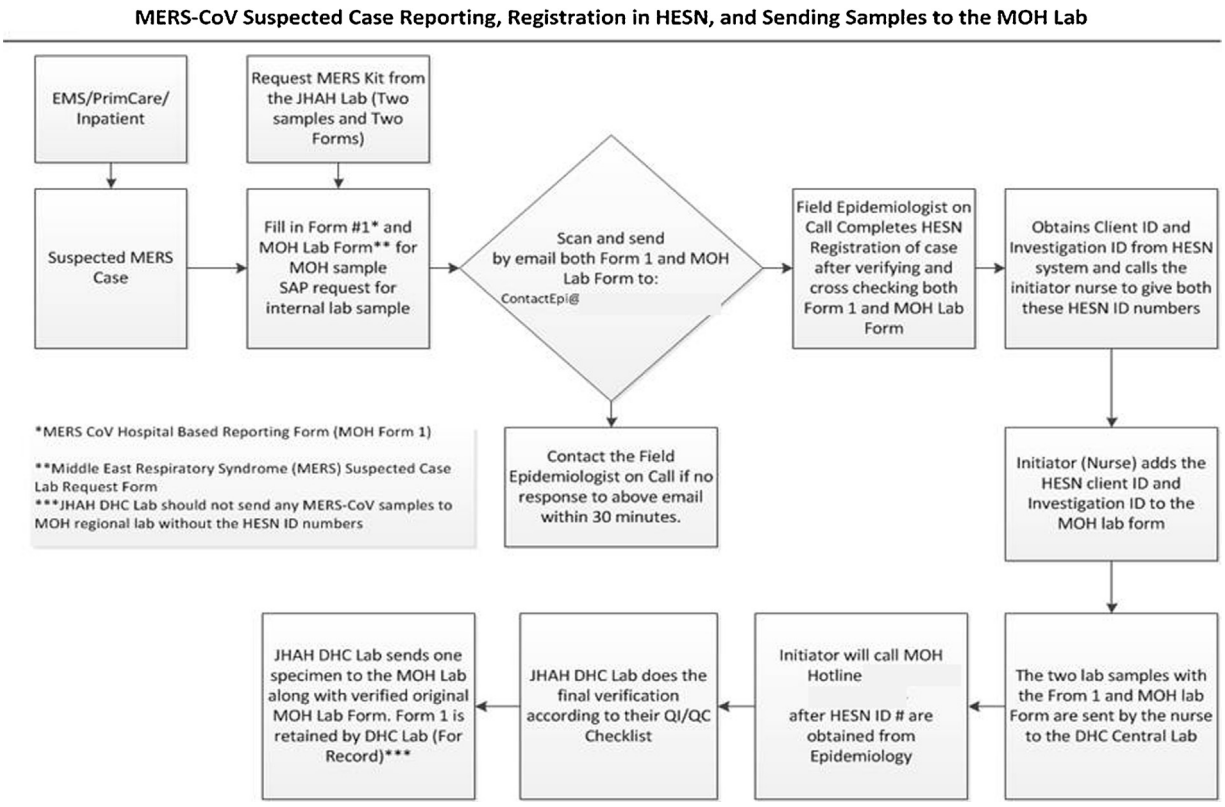

Fig. 2. A flow diagraph of the process for reporting suspected MERS-CoV patients.
EMS: Emergency Service; MERS: Middle East Respiratory Syndrome; JHAH; Johns Hopkins Aramco Healthcare; MOH; Ministry of Health; HESN: Health Electronic Surveillance Network; ID: identification number.

and streamlined. The process included completing the forms and sending them by e-mails.

Competency assessment continued in the clinical care area over the following weeks where the nurse educators observed nurses in practice, and provided ongoing support and guidance when required. Competent nurses were then in a position to advise other healthcare providers on the PPE standards that are necessary when caring for patients suspected or confirmed to have MERS CoV.

Over 450 nurses attended the Nasopharyngeal Skill Day. Twenty five nurse educators provided individual training for nurses who were unable to attend. In total over 1000 nurses received training and continue to receive support and guidance to ensure safe and effective practice is maintained. Donning and doffing PPE and N95 mask fit testing has also become an annual mandatory competency requirement for staff in nursing and other clinical services to maintain standards and contribute towards staff safety in the management of patients with actual or suspected MERS CoV.

Discussion

One of the prime importances in situations of outbreaks and emerging infectious diseases is the prevention of the spread of these agents within healthcare settings. This is even more important in the case of MERS-CoV as there were multiple healthcare associated outbreaks and healthcare workers were at an increased risk of infection [2–8]. Thus, we developed this activity to train specific healthcare workers in the process of triaging and obtaining nasopharyngeal swabs from suspected patients. The process provides a venue to limit the exposure of healthcare workers and to optimize the skills of selected group to obtain nasopharyngeal swabs. The implemented strategy helps in minimizing the risk of transmission of the MERS virus and serves as an early detection method. Early detection was facilitated by effective triage at entrances, cohorting of patients with upper or lower respiratory tract infections, and awareness of the MERS-CoV case definition. The case definition was distributed in a pocket size card to facilitate a quick reference. Adequate triage, isolating all suspected cases and managing them with appropriate infection control precautions aid in the prevention of nosocomial spread of MERS-CoV. The initial targeted groups were healthcare workers at the first patients encounter. Multiple outbreaks had occurred in emergency rooms [6,19–22] highlighting the importance of having healthcare workers working in these areas as the primary focus of education and training. Having a dedicated staff who were trained and well informed about the virus, its transmission and techniques and processes of infection control had a great positive impact on alleviating anxiety and fear. It was shown that adherence to infection control measures reduced MERS-CoV transmission [23]. During the SARS outbreak, intensive training of staff for the use of personal protective equipment and infection-control procedures were important components of the control strategies [24]. We believe that such a program of education and training would alleviate negative attitudes of staff towards providing care for patients with MERS-CoV or SARS [25]. We specifically designed the described program to train healthcare workers as it was noted that staff who had <2 h of infection control training had a higher risk of SARS [26].

One of the component of the program was N-95 fit testing. The use of N-95 fit-tested respirators was not widely applied in healthcare settings prior to the SARS epidemic [27,28]. Fit testing ensure the selection of the proper respirator brand, model, and size to protect against pathogens requiring air-borne infection isolation precautions [28].

The development of activity and program required an interprofessional collaboration through shared values and ethics,

understanding roles and responsibilities, excellent communication skills, and demonstrating teamwork behaviors. Addressing the uncertainty and the risk of exposure to MERS-CoV by setting a skill lab and a competency program are important elements to alleviate nurses' anxiety. It was reported previously that MERS-CoV caused a high level of distress among nurses [29]. And that emergency nurses had ethical concerns as they try to avoid such patients [30]. It is important to have full education and skills as understanding of and agreement with infection control practice were associated with compliance with proper care of MERS patients [30].

Challenges arise due to various professional cultures and stereotypes. However, working towards a common goal and a shared vision, and respecting all opinions were important tolls that we used to establish a dedicated team for MERS-CoV competency. In addition, commitment from the executive team was an enabler of the process. An organizational response to emerging infectious diseases must be based on an interdisciplinary perspective and includes recommendations from national and international health authorities. Nurses are the frontline providers and they are the foundation of any response activities. They need to be alerted to the signs and symptoms of emerging diseases such as MERS-CoV. Emergency departments and primary care units must ensure the application of specified protocols incorporated into triage and screening processes to ensure early identification and management of MERS-CoV. The application of specified protocols minimizes the risks of cross infection, placing emphasis on patient and staff safety as well as expediting the patient to receive appropriate treatment. Nurse educators have an instrumental role in training nurses and other healthcare providers on the specifics needed to identify, contain and manage patient presenting with MERSCoV. Using national and international recommendations, organizational responses can be tailored to provide safe and effective practice guidelines to protect staff and patients alike. The emergence of MERS-CoV in Saudi Arabia required a rapid, coordinated response to identify the virus and organize a national approach for containment and management. Health policy focuses on healthcare goals for a society as a whole and, in this case, the Saudi Arabian Ministry of Health identified the potential risk to the population and acted in accordance with public health aims.

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Competing interests

None declared.

Ethical approval

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