Knowledge and Behavior of Intensive Care Unit Health Care Workers Towards MERS-CoV

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ABSTRACT

Background: Middle Eastern Respiratory Syndrome (MERS) is an emerging infection where the majority of cases have been reported from the Arabian Peninsula. Poor compliance of healthcare workers (HCWs) allows for the spread of the infection, which may lead to devastating outbreaks. Lack of knowledge on IC standards to an emerging pathogen and lack of a safety culture within the organization are main reasons for poor compliance by HCWs. 

Objective: This study aimed to assess the knowledge and behavior of intensive care unit (ICU) HCWs in two major hospitals where MERS outbreaks took place 18-24 months prior. 

Methods: A validated questionnaire was emailed to all ICU staff from two different hospitals 18-24 months after encountering a major MERS outbreak to assess their knowledge and IC practices relevant to MERS. The questions focused on the knowledge and behavior of the target group on expected infection control practices that would ensure patient and HCW safety. 

Results: 150 HCWs from hospital A and 142 HCWs from hospital B responded. The majority were female (n=183; 63%) between the age 30-50 (n=180; 62%); with at least 7 years of experience; 160/292 (55%) of respondents were unaware that proper hand hygiene (HH) could prevent the spread of MERS. The majority of respondents were in favor of receiving more information about the disease (96.8%, 98.6%) from hospital A and B, respectively. And finally, the vast majority of HCWs acknowledged their role in preventing the spread of the infection. 

Conclusion: Knowledge and compliance of HCWs on the proper IC practices are important to ensure patient and HCW safety. This study highlights poor knowledge on proper IC practices and lack of accountability among HCWs for complying with IC standards. More innovative methods for education and auditing HCWs and a better understanding of how to create a culture of accountability in the healthcare setting is needed.

Keywords: Knowledge, Behavior, Intensive Care Unit, Health Care Workers, MERS-CoV

1. INTRODUCTION

MERS is an emerging zoonotic infection that was described for the first time in a human in 2012 [1,2]. This is an illness with a high mortality rate among patients with comorbidities, [3] which till today has neither proven therapy nor an effective vaccine. Serological studies have proven the circulation of the virus in dromedary camels in the Arabian Peninsula for at least 20 years [4]. The first hospital outbreak dates back to April 2012 after a retrospective assessment of an outbreak that involved seven HCWs and claimed three lives in the Kingdom of Jordan [5]. Since then, the Kingdom of Saudi Arabia (KSA) has been the epicenter for this pathogen, with over 80% of the cases taking place in KSA and with at least nine health care associated outbreaks nationwide [6]. The significant enhancement of
IC practices in healthcare settings and proper education of HCWs on MERS-CoV case definition in KSA have led to a significant drop in the occurrence of healthcare associated outbreaks. Today most cases in KSA are sporadic occurrences from the community [6].

A cornerstone of ensuring patient safety is the proper implementation of IC practices in healthcare settings. For this to actually take place a strong culture of safety needs to exist with a strong accountability underpinning [7]. In the event of an emerging infection this is a challenge, as knowledge of HCWs on the illness is incomplete or in many instances incorrect or lacking. In addition, IC guidelines are either absent, incomplete, or evolving with time as more knowledge on the pathogen and the illness is growing [8,9]. This was experienced firsthand in KSA with the emergence of MERS-CoV, where HCW compliance with IC practices was suboptimal [10].

In 2015, two major institutions experienced large MERS outbreaks. Despite detailed IC programs, transmission took place in these organizations. Among the culprits blamed for the occurrence of the outbreaks were: structural challenges of the facility, poor knowledge among HCWs on the emerging virus, manpower shortage and lack of an accountability system to ensure compliance with IC standards [11,10].

This study aimed to look specifically at the knowledge and behavior of intensive care unit (ICU) HCWs in two major hospitals where MERS outbreaks took place 18-24 months prior.

2. METHODS

Setting
The study examined two major teaching hospitals in the capital city of Riyadh, Saudi Arabia; and these will be referred to as hospitals A and B. Hospital A is a 1000 bed, tertiary care center with the largest critical care department in the region, 120 bed. Hospital B is an 800-bed care center with 14 surgical ICU bed.

Participants
ICU HCWs were selected for this study since the staff cared for MERS patients during the outbreak. The study was conducted 18-24 months after the hospitals had an outbreak. The questionnaire was mailed to the HCWs using their official work email address, through the official hospital email system. A period of two weeks was provided for the participants to return the questionnaire. A reminder was sent out for those who did not respond after 2 weeks of the original request, and a second two-week period was provided. If there was no response by the end of the second two-week period, the candidate was dropped from the study.

Questionnaire
A previously validated questionnaire was used to measure the knowledge and attitude of healthcare workers towards MERS; with a reliability of 0.74 [12]. The questionnaire contains three sections. The first section addresses participant’s demographics. The second section addresses participant’s knowledge on MERS as a disease, mode of transmission, diagnosis and treatment. The final section includes questions on HCW’s attitude and adherence to IC practices while dealing with MERS patients.

Data analysis
Data obtained from the participants’ questionnaires were statistically analyzed with SPSS (Version 23.0. Armonk, NY: IBM Corp) was used for all statistical analyses. All data were analyzed and reported as number and percentages. A Wilcoxon rank sum test was used to calculate the P-value for dependent and independent variables. Statistically significant P-value was anything less than 0.05 (p <0.05).

3. RESULTS

Total HCW response was 150 and 142 from hospitals A and B, respectively. The majority of participants were nurses: 63 (42%) and 102 (71.8%), from hospitals A and B respectively. Majority had more than 7-years of experience in the healthcare setting (Table 1). Participants’ knowledge regarding MERS is detailed in Table 2.

| Table 1: ICU and ER participant demographics from hospital A and hospital B |
|-------------------------------|-----------------|----------------|
| **Variable**                  | **Hospital A**  | **Hospital B** |
| **N**                         | **%**           | **N**          | **%**          |
| Profession                    |                 |                |
| Physician                     | 50              | 33.3           | 12             | 8.5            |
| Nurse                         | 63              | 42.0           | 102            | 71.8           |
| Respiratory Therapist         | 17              | 11.3           | 15             | 10.6           |
| Others                        | 20              | 13.3           | 13             | 9.2            |
Majority of participants knew the symptoms of MERS at 133 and 136 (97.8% and 97.1%), respectively. Those who knew that MERS patients develop severe acute respiratory illness are 132 and 137 (95.7% and 98.6%). MERS virus spreads through close contact with infected persons are 122 and 133 (89.7% and 96.4%) and that special caution must be taken when a patient presents with MERS symptoms at 119 and 133 (87.5% and 95.7%), respectively. However, participants from hospitals A and B did not know the actual incubation time for MERS virus: 43 and 13 (31.9% and 9.2%). The majority believed that
antibiotics were the first line of treatment for MERS: 74 and 55 (54% and 40.4%). Hospitals A and B differ in their knowledge of the cause of MERS-CoV with 73 and 87 (54.1% and 65.9%) and the belief that HH will decrease the spread of MERS at 85 and 102 (62% and 73.4%), respectively.

Participants’ attitude towards MERS and IC practices were very similar among HCWs in both hospitals as shown by the mean attitude scores to all 7 questions; Table 3. In Hospitals A and B, the majority of participants believed that information regarding the virus should be disseminated to all HCWs 123 and 129 (96.8% and 92.8%) to improve staff knowledge of the virus. The participants also agreed that IC practices should be used, such as, PPE being worn 123 and 140 (99.2% and 100%); patients being isolated 124 and 138 (99.2% and 98.5); and, that following IPC programs would reduce the transmission of MERS, 221 and 132 (96.9% and 94.3%). However, few participants from both hospitals showed a negative attitude towards universal IC practices, such as HH among 18 (13.4%) participants.

Table 3: Attitude of HCWs regarding MERS-CoV from hospital A and hospital B

<table>
<thead>
<tr>
<th>Attitude of healthcare workers about MERS-CoV</th>
<th>Hospital A N(%)</th>
<th>Hospital B N(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Any related information about MERS should be disseminated among peers and other healthcare workers</td>
<td>SA (73.2) 30 (23.6) 3 (2.4) 1 (0.8) 0</td>
<td>SA (52.5) 56 (40.3) 9 (6.5) 1 (0.7) 0</td>
</tr>
<tr>
<td>2. Gowns, gloves, mask and goggles must be used when dealing with MERS patients</td>
<td>110 (88.7) 13 (10.5) 0 1 (0.8) 0</td>
<td>123 (87.9) 17 (1.1) 0 0 0</td>
</tr>
<tr>
<td>3. Healthcare workers must be updated with current information about MERS</td>
<td>106 (84.1) 16 (12.7) 3 (2.4) 1 (0.8) 0</td>
<td>113 (80.7) 25 (17.9) 1 (0.7) 0 1 (0.7)</td>
</tr>
<tr>
<td>4. Intensive and emergency treatment should be given to diagnosed patients</td>
<td>93 (73.8) 22 (17.5) 8 (6.3) 3 (2.4) 0</td>
<td>100 (71.9) 23 (16.5) 14 (10.1) 2 (1.4) 0</td>
</tr>
<tr>
<td>5. MERS patients should be kept in isolation</td>
<td>104 (83.2) 20 (16.0) 0 0 1 (0.8)</td>
<td>122 (87.1) 16 (11.4) 1 (0.7) 0 1 (0.7)</td>
</tr>
<tr>
<td>6. Prevalence of MERS can be reduced by the active participation of healthcare workers in hospital infection prevention and control programs</td>
<td>90 (70.9) 33 (26.0) 4 (3.1) 0 0</td>
<td>89 (63.6) 43 (30.7) 8 (5.7) 0 0</td>
</tr>
<tr>
<td>7. Transmission of MERS-CoV infection can be prevented by using universal precautions given by CDC, WHO, etc</td>
<td>83 (65.4) 39 (30.7) 1 (0.8) 2 (1.6) 2 (1.6) 89 (64.0) 37 (26.6) 5 (3.6) 5 (3.6) 3 (2.2)</td>
<td></td>
</tr>
</tbody>
</table>

Mean attitude score ± SD: Hospital A: 14.69±0.56, 24.87±0.40, 34.80±0.51, 44.63±0.71, 54.81±0.50, 64.68±0.53, 74.57±0.74. Hospital B: 14.45±0.65, 24.88±0.33, 34.78±0.52, 44.59±0.73, 54.84±0.48, 64.58±0.60, 74.47±0.90

4. **DISCUSSION**

This study demonstrates the need for continuous education on IC practices for HCWs as well as establishing an accountability system to ensure compliance in all healthcare settings. With multiple healthcare associated outbreaks of MERS in the Kingdom, and the significant attention by the Saudi Ministry of Health on the importance of abiding by IC practices, healthcare associate MERS outbreaks became a rare occurrence [6]. However, from this study and others, it is interesting to realize that, at the bedside level, HCWs continue to have inaccurate knowledge or knowledge gaps on proper IC practices [11-12]. This poses a continuous risk for a potential of a future MERS outbreak for any institution. At the very basic level of IC education it was disappointing to reveal that HWCs knowledge on HH was inaccurate. Close to a third of HWCs in both hospitals were unable to respond correctly to the HH question. International and national accreditation bodies mandate HH programs that abide by the WHO multimodal system [13]. Both institutions included in this study are accredited hospitals. On the other hand,
the challenge with HH compliance is more of a global one. Studies have demonstrated the need for various approaches to enhance HH compliance rates [14,15]. For example, HCW perception is critical and has a major influence on HH compliance rates [16,17]. Moro et al, in a large study from Italy, used videos of real-life scenarios; practical learning and hands on training were used as innovative methods for their HH campaign [16]. Such innovative methods have been proven effective in changing behavior [18]. A more difficult IC challenge is ensuring compliance of HCWs with personal protective equipment (PPE) in handling patients on contact, droplet or airborne isolation [18].

This study identified that the vast majority of participants agreed to the proper PPE needed for MERS patients. However, it is known that auditing HCW’s compliance with PPE, similar to HH, is quite low. One of the major roles of any IC program is to establish an auditing process on compliance with PPE and HH for isolated patients [19]. Most of these studies address compliance with IC for well-known infectious risks. Since MERS CoV was an emerging pathogen causing a new illness, the IC practices were evolving and changing as more became known about the virus and its risks for transmission. Such knowledge growth posed challenges in convincing HCWs on the proper procedures for isolation, and skepticism was there. IC policies have been established to improve safety of patients and HCWs. However, without a holistic accountability system for which HCW accountability is one part of a larger accountability system, HCW’s will not abide by IC policies, or any other governing policies for that matter [20]. As articulated in the 2003 report by Brinkerhoff, “Healthcare organizations’ needs are expected to create the immediate framework for accountability where organizational procedures, rules, routines, and hierarchical relationships shape the pressures and sanctions that hold HCWs to account and influence their behaviors.” The same report addresses all 4 elements of accountability, namely: information access, awareness, gratification and competence, in creating a system of accountability but is out of the scope of this study [20]. However, it would be interesting to identify challenges to specific healthcare organizations [21]. For example, both involved hospitals have detailed IC programs, which address proper HH and PPE practices. They have a validated HH auditing process based on WHO’s 5-HH moments. Further, one of the hospitals launched a massive education program for all HCWs on proper skills for HH, donning and doffing of PPEs. It also developed a pledge system, where all HCWs pledged to perform at their highest ability to prevent transmission of infection within the organization. Two years later, however, HH compliance rates and proper donning and doffing of PPE seem to slip back to lower rates as seen before the outbreak. Both hospitals have not been able to identify a holistic accountability system yet.

The major limitation of this study is that it relies on the response of the HCWs and not on the actual observations of their practices. Secondly, it focused on the ICU group of HCWs, which may have provided a biased positive response than if it had tackled the emergency or surgical departments. An ICU setting is more likely to be a controlled environment and not accommodating patients beyond their bed capacity, unlike an emergency room department for example. Finally, the study was conducted at least 18 months after the actual MERS outbreak where those who were involved in the outbreak may have left or have forgotten the impact of the outbreak on their behavior.

5. CONCLUSION

I conclude by proposing the need for future research to be conducted on understanding the knowledge of HCWs on emerging pathogens and its impact on their practices within the healthcare setting under the umbrella of behavioral research. Also, there is a need to understand how to enhance the safety culture of an organization, specifically large ones, where HCWs are of various nationalities and background. These would be important to unify practices and to establish and sustain a culture that embraces patient safety.

REFERENCES


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