

## Brief Report

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# Knowledge, Attitude, and Training of Health-Care Workers and Preparedness of Hospital Emergency Departments for the Threat of Communicable Diseases at Mass Gathering Events in Qatar: A Cross-Sectional Study

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## Abstract

**Objective:** This study aimed to assess the knowledge, attitude, and training of health-care workers (HCW), and their perception of the preparedness of hospitals for communicable disease (CD) threats during mass gathering (MG) events.

**Methods:** This was a cross-sectional study conducted from June 1 to July 31, 2019, of doctors and registered nurses working in the emergency departments (EDs) of 5 main hospitals in Qatar. A self-administered online survey was used for data collection.

**Results:** The overall mean knowledge score about CD threat among study participants was 75.0% (SD ± 18.1). The majority of the participants had a favorable attitude toward CD preparedness during MG events. The participants achieved high scores in attending workshops on triaging, first aid, and infection control. Study participants as well had favorable perceptions about the current preparedness of their respective hospitals to respond to CD outbreaks in MG events.

**Conclusions:** The participants were knowledgeable about the risk of CD outbreaks during MG events (eg, Federation of International Football Association (FIFA) World Cup games 2022) and had a favorable attitude and necessary training to respond to such outbreaks. Regular practice drills are necessary to ensure that all members of the workforce are knowledgeable of the necessary actions to take in emergent high-risk situations.

Mass gatherings (MGs) at special events present a potential public health hazard because of the risk of transmission of communicable diseases (CDs).<sup>1</sup> The size of MGs may range from as low as 1000 to more than 25,000 people.<sup>2</sup> The public health hazards associated with such large-scale events can be unpredictable and complicated and may include outbreaks of CDs, travel-related infections, violence, and issues related to sanitation and hygiene.<sup>3</sup>

Some reasons for CD outbreaks include crowding, inadequate hygiene and sanitary practices, sociodemographic factors such as age and gender, and pre-event health status.<sup>3,4</sup> The main CDs that may raise a public health concern during MG events include seasonal influenza, cholera, measles, hepatitis A, and meningitis.<sup>5</sup> For instance, during preparations for the Brazil 2014 Federation of International Football Association (FIFA) World Cup, of the 1586 travelers who had participated in the event were examined for CDs, 40% had developed dermatological diseases, 25% diarrheal diseases, and 19% febrile systemic illnesses.<sup>1</sup> Moreover, the 2006 Asian Games held in Doha, Qatar, reported an outbreak of chickenpox among the volleyball team players who had come from the Maldives.<sup>6</sup>

The main role of health-care workers (HCWs), as frontline responders in combating and containing the spread of CDs in MG events, depends to a great extent on their knowledge, attitude, and training, especially those working in emergency departments (EDs).<sup>7,8</sup> Effective preparedness and response in pandemic situations by HCWs requires specialized training and knowledge.<sup>7,9</sup> A study in Saudi Arabia reported that health-care professionals' mean knowledge score about disaster and emergency preparedness was satisfactory (77.5%).<sup>10</sup> However, a cross-sectional study in Yemen reported that only 32.0% had good knowledge, 53.5% had fair, and 14.5% showed poor knowledge about emergency preparedness.<sup>8</sup> The researchers suggested that educational levels may have been a key factor in the knowledge gap.

Qatar is a country that is characterized by its strategic location in the east of the Arabian Peninsula with an estimated total population around 2.8 million.<sup>11</sup> As Qatar will be hosting the 2022 FIFA World Cup games with thousands of people from all around the world expected to attend, the potential risk of CD outbreaks occurring might be high. Therefore, assessing the preparedness of HCWs for MG events in Qatar is critical for any potential risk of CDs occurring. Thus, this study aimed to assess the knowledge, attitude, and training of HCWs working in EDs, and their perception of the preparedness of their hospitals for CD threats during MG events.

## Methods

### Study Design

This was a cross-sectional study conducted from June 1 to July 31, 2019.

### Study Population and Setting

The target study population was 783 physicians and registered nurses working in the EDs of 5 public hospitals operated by the Hamad Medical Corporation in the State of Qatar (Hamad General Hospital, Hazm Mebareek Hospital, Cuban Hospital, Al Wakrah Hospital, and Al Khor Hospital). Physicians and nurses who were not available at the time of the study (eg, on leave) were excluded.

### Study Tool and Data Collection

A structured, anonymized, self-administered questionnaire was designed and distributed through Survey Monkey, a Web-based application, to all potential participants. The questionnaire was adapted from previous studies<sup>10</sup> and was intended to assess HCWs' knowledge, attitudes, and training and their perception of the preparedness of EDs to respond to CD threats during MG events. The face and content validity of the questionnaire were ensured by conducting an extensive search of the literature, and critical review by an expert panel made up of public health experts and emergency medicine consultants. It comprised 5 sections: (1) background characteristics with 10 items, (2) knowledge questions with 11 items, (3) attitude questions with 10 items, (4) training questions with 4 items, and (5) ED preparedness questions with 10 items. The questionnaire was piloted with 20 individuals to assess its comprehensiveness and clarity.

### Measures

Responses to the knowledge questions were assigned a score of 1 for each correct answer and 0 for each incorrect answer. Therefore, the overall knowledge scores computed could range from 0 to 11. The scores were categorized as <40% denoting very low knowledge, 40% - <60% low knowledge, 60% - <80% moderate knowledge, and ≥80% high knowledge. HCWs' attitudes, training, and perception of ED preparedness were expressed as proportions.

### Statistical Analysis

Data were analyzed with the Statistical Package for the Social Sciences (SPSS) version 23. Descriptive and inferential statistics were used to analyze the data. For continuous variables, means and standard deviations (±SD) were calculated. For categorical variables, frequencies, and percentages were used. Comparing the distribution of categorical variables was computed using the Chi-squared test. Independent Student t-test was used to test

**Table 1.** Participants' background characteristics and their mean knowledge scores ( $N = 261$ )

Variable	<i>n</i> (%)	Mean knowledge score (%)	95% CI
<b>Gender</b>			
Male	152 (58.9)	75.9	72.9 - 78.9
Female	106 (41.1)	73.8	70.3 - 77.4
<b>Age (year)</b>			
<30	34 (31.1)	74.3	67.8 - 80.8
30-39	139 (53.7)	73.9	70.8 - 77.1
40-49	68 (26.3)	77.0	72.6 - 81.4
≥ 50	18 (6.9)	78.3	69.5 - 87.1
<b>Nationality*</b>			
Arab Countries <sup>a</sup>	33 (13.1)	73.0	67.3 - 78.7
South East Asia <sup>b</sup>	97 (38.6)	69.2	65.5 - 73.0
Far East <sup>c</sup>	72 (28.7)	84.1	80.4 - 87.7
Latin America <sup>d</sup>	45 (17.9)	73.4	67.4 - 79.4
UK and USA <sup>e</sup>	4 (1.6)	90.9	62.0 - 99.8
<b>Profession*</b>			
Doctor	28 (10.7)	85.1	79.0 - 91.2
Nurse	233 (89.3)	73.9	71.5 - 76.3
<b>Hospital of work</b>			
Hamad General Hospital	122 (47.3)	74.7	71.5 - 77.8
Hazm Mebareek Hospital	72 (27.9)	77.3	61.6 - 93.0
Cuban Hospital	47 (18.2)	86.4	74.7 - 98.0
Al Wakrah Hospital	11 (4.3)	73.8	68.1 - 79.5
Al Khor Hospital	6 (2.3)	74.4	69.8 - 79.1
<b>Experience in emergency department (year)</b>			
<1	18 (6.9)	72.2	63.7 - 80.7
1 ≤ 5	129 (49.6)	74.9	71.6 - 78.3
5 ≤ 10	52 (20.0)	74.9	69.4 - 80.4
≥10	61 (23.5)	76.3	71.8 - 80.7

\* $P$ -value < 0.01.

<sup>a</sup>Egypt, Iraq, Jordan, Libya, Morocco, Palestine, Sudan, Syria, Tunisia, Yemen.

<sup>b</sup>India, Pakistan.

<sup>c</sup>Philippine.

<sup>d</sup>Cuba.

<sup>e</sup>United Kingdom, United States of America.

significant differences between 2 independent means, and analysis of variance (ANOVA) was used to test significant differences between more than 2 independent means. A  $P$ -value < 0.05 was considered significant.

## Results

### Background Characteristics

As shown in Table 1, 261 of 783 invited doctors and nurses completed the online questionnaires with a response rate of 33%. Their mean age was 36.9 y (SD ± 7.5) and 58.9% were male. The vast majority of respondents were nurses (89%). Professional experience working in EDs ranged from 1 to 5 y (49.6%) and more than 5 y (43.5%). The overall mean knowledge score about preparedness to CD threats during MG events was 75.0% (SD ± 18.1). The mean knowledge score did not vary by age, gender, hospital of work, and duration of work in the EDs. However, doctors' mean knowledge score was significantly higher (85.1%) than nurses' (73.9%) with a  $P$ -value of 0.003. The mean knowledge scores of professionals from

**Table 2.** Knowledge, attitude, and hospital preparedness to CD threats during MG events ( $N = 261$ )

Knowledge questions	n (%)
What is the definition of disaster?	229 (87.7)
What is the definition of pandemic?	246 (94.2)
What is an influenza pandemic?	174 (66.6)
The influx of people to a single location at the same time is defined as a Mass Gathering, which places a strain on existing surveillance and response systems with increased media and political attention. Does this mean that the adverse consequences of any negative health event may be greatly magnified?	202 (77.4)
Is it necessary to have well-functioning systems for surveillance/response during MGs in place?	197 (75.5)
What does emergency and disaster planning involve?	203 (77.7)
What are the diseases that should be considered for surveillance during MGs such as FIFA World Cup 2022?	207 (79.3)
Do you think Qatar may be affected by a CD disaster during MG sports events such as FIFA World Cup 2022?	150 (57.5)
Do you think your hospital may be affected by a CD disaster during MG sports events such as FIFA World Cup 2022?	150 (57.5)
What is the potential source of CDs during MG sports events and during FIFA World Cup 2022?	198 (75.9)
Which of the following CD disasters can occur during FIFA World Cup 2022?	174 (66.6)
Attitude questions	n (%)
I need to know about the CD disaster plans before the FIFA World Cup 2022	256 (98.1)
Any CD disaster plan should be regularly updated	256 (98.1)
CD disaster plans should not be for a few people in the hospital	207 (79.3)
It is necessary to have a CD disaster plan in the hospital for MG sports events including FIFA World Cup 2022	256 (98.1)
Management should be adequately prepared should a CD disaster occur during MG sports events including FIFA World Cup 2022	259 (99.2)
Disaster management is not for nurses/doctors only	228 (87.4)
CD threats should be identified early for better control	259 (99.2)
Training is necessary for all health management staff	256 (98.1)
Disaster simulations should occur frequently in the hospital before the FIFA World Cup	253 (96.9)
Drills should be conducted in the hospital before the FIFA World Cup 2022	256 (98.1)
Preparedness question	n (%)
There is a CD disaster plan in my hospital	204 (78.1)
There are guidelines for case definition/management in my hospital	221 (84.7)
There is access to suitable laboratory facilities to confirm or exclude diagnosis	209 (80.1)
Event attendees can be isolated if exposed to CDs in my hospital	238 (91.2)
Is there a referral system in place in your hospital?	253 (96.9)
There is a system in place for reporting of CDs	255 (97.7)
Necessary resources exist for tracing/interviewing contacts	228 (87.4)
My hospital can deal with different foreign languages/interpreters available	213 (81.6)
There are disaster drills done at your hospital	208 (79.7)
There are triage simulations done at your hospital	209 (80.0)

the UK or the United States were significantly higher compared with those from other countries ( $P$ -value  $< 0.01$ ).

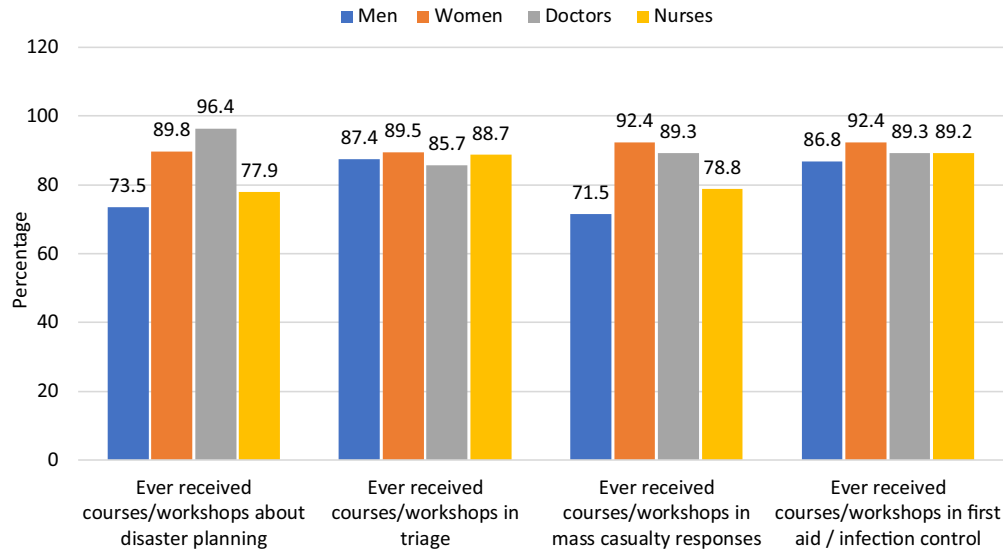
### Knowledge, Attitude, and Perception of ED Preparedness

Table 2 shows participants' reported correct answers to the knowledge items as well as their responses to the attitude and perception of preparedness items. Approximately 80% were able to correctly identify the CDs that should be considered for surveillance procedures during MG events. More than three-quarters (75.9%) were aware of the potential source of CDs during MGs. Furthermore, approximately 57.5% were aware that Qatar could be affected by a CD outbreak during MGs. Regarding HCWs' attitude toward CD preparedness, almost 98% agreed that they needed to know about existing CD disaster plans, recognized the importance of updating them within the hospital, and agreed that drills should be conducted in the hospital before the FIFA World Cup 2022. Regarding their perception of the preparedness of their respective hospitals to respond to the threat of CDs during MG events, 96.9% claimed that a referral system was available in their hospital, 97.7%

reported the presence of a system for the reporting of CDs, and 78.1% reported the existence of a CD disaster plan.

### Training of HCWs in CD Preparedness During MGs

Overall, 207 (79.3%) of the participants reported ever receiving courses/workshops in disaster planning and in mass casualty responses, 229 (87.8%) in triage, and 231 (88.5%) in first aid/infection control. Figure 1 displays HCWs' training in CD preparedness according to gender and profession. In all training subject categories the proportion of females who received training was higher than males. However, only the proportion of females who received training in disaster planning (89.8% vs 73.5%;  $P < 0.01$ ) and mass casualty responses (92.4% vs 71.5%;  $P < 0.01$ ) were significantly higher than the proportion of males. Moreover, the proportion of doctors who received training in disaster planning was significantly higher than nurses (96.4% vs 77.9%;  $P = 0.01$ ). However, the proportion of those who received training in triage, mass casualty responses, and first aid/infection control did not significantly differ by profession.



**Figure 1.** Training of HCWs in CD preparedness during MGs by gender and profession ( $N = 261$ ).

## Discussion

To the best of our knowledge, this study is the first of its kind in Qatar. This study assessed the knowledge, attitude, training of HCWs, and their perception of the preparedness of hospital EDs for CD threats during MG events. Prompt and effective response to CD outbreaks during MG events requires that frontline HCWs have the correct knowledge, adequate training, and proper attitude about CDs and outbreaks and especially those working in EDs.<sup>7,8</sup> It is also necessary for EDs to have the necessary preparedness to effectively and promptly respond to such drastic situations.<sup>7</sup>

An essential condition of preparedness to CD outbreaks is a basic understanding of relevant concepts such as disasters, pandemics, and influenza. The results of this study showed a high percentage of correct knowledge of the concepts of pandemic and disaster, but moderate knowledge about influenza. This is consistent with the study by Berhanu et al. (2016) where the majority of their health-care professional participants (85.1%) were able to correctly describe the concept of disaster.<sup>9</sup> On the other hand, in a study in Yemen about the knowledge and attitude of health-care professionals, 68% had poor to fair knowledge.<sup>8</sup>

In terms of attitude toward preparedness for CD threats during MG events, the majority of the participants in our study expressed a favorable attitude consistent with the study by Nofal et al. (2018), where only 6.3% of the participants indicated no interest in disaster plans.<sup>10</sup> Almost all of our participants (98.1%) as well as 98.4% in the study by Nofal et al. (2018) agreed that hospitals needed to update their CD disaster plans regularly. In both studies, the participants scored high on the importance of preparedness of managerial staff, 99.2% and 93.7%, respectively. These are all reflective of HCWs' favorable attitudes toward preparedness for responding to CD pandemics arising from MG events.

Regarding training, high scores were obtained for attending workshops in triaging (87.8%) and first aid and infection control (88.5%). This is in contrast to only 21% of health-care professionals who were trained in disaster-related subject in a study in Southwest Ethiopia.<sup>9</sup> Similarly, a study in Saudi Arabia about the preparedness of ED nurses reported that only 3% had received current training.<sup>7</sup>

In our study, participants as well had favorable perceptions about the current preparedness of their respective hospitals' EDs

to respond to CD disasters in MG events. The majority reported that referral systems were available (96.9%) and systems were in place for reporting of CDs (97.7%). In a study in the United States about the pandemic influenza and major disease outbreak preparedness in hospitals in general and specifically in EDs reported 85% of the health professionals surveyed acknowledged the existence of such plans in their hospitals, while only 68% confirmed that their EDs had such plans.<sup>12</sup>

Several strengths were highlighted in this study, including recruiting participants from 5 main public hospitals in the State of Qatar. This contributes to having a representative sample of HCWs working in EDs. This study is a significant step in building a solid foundation towards understanding HCWs' knowledge, attitudes, and training across HMC hospitals to enable building the recommended capacity to effectively respond to CD threats in the upcoming 2022 FIFA World Cup games in the State of Qatar.

## Limitations

The study as well had a few limitations. One potential limitation was the probability of having recall bias. We relied on participants' capacity to recall their training about CDs and pandemics. Still, in future studies, such biases may be addressed by searching for alternative sources such as hospital records of training provided. With only 33% of the HCWs responding to the survey may have potentially led to under-coverage bias. However, the target population is not very diverse as it is made up of physicians and nurses who are working in the EDs of the respective 5 hospitals. Sending follow-up reminders to the potential participants may be a useful strategy to increase response rates. Another notable limitation is the applicability of our findings to other hospitals outside Qatar because of diverse organizational mandates. As well, the recent COVID-19 pandemic may have influenced HCWs' knowledge, attitude, and perceptions about preparedness to respond effectively to future MG events.

## Recommendations

While the participants in this study showed the necessary knowledge, attitude, and training, as new CDs emerge, it would be necessary to update training programs based on the most current

evidence in the recognition of and response to outbreaks. In addition, regular practice drills are necessary to make sure that all members of the workforce are knowledgeable of the necessary actions to take in emergent high-risk situations.

## Conclusions

This study examined the knowledge, attitude, and training of registered nurses and physicians working in hospital EDs. The study also examined their perception of the preparedness of their respective hospitals. This is the first study in Qatar on these subjects. In general, doctors and nurses are knowledgeable about the risk of CD outbreaks during MG events and have the proper attitude and necessary training to respond to such outbreaks. As well, they consider their respective hospitals have the necessary preparedness to respond to such outbreaks promptly and effectively.

**Data availability statement.** Data are available upon reasonable request.

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**Author contributions.** H.A.R. and T.F. conceived and designed the study. H.A.M., L.M., and E.F. contributed to the recruitment of the participants and to the acquisition of the data. S.S. and A.A.D. analyzed the data. A.A.D. and V.K. evaluated the results, interpreted the findings and wrote the manuscript. All authors revised and approved the final manuscript.

**Ethical standards.** The research protocol was approved by the Research Department at the Ministry of Public Health in Qatar. An electronic-based information sheet enclosed with informed consent was shared with all participants along with the survey questionnaire. The data were stored on a secure, password-protected computer with limited access.

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