Respiratory Therapists’ Knowledge, Skills, and Attitudes Regarding MERS-CoV Disasters

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Respiratory Therapists’ Knowledge, Skills, and Attitudes Regarding MERS-CoV Disasters

By

Naif Makmi Alruwaili

A Thesis

Presented in Partial Fulfillment of the Requirement for the

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In

The Department of Respiratory Therapy

Under the supervision of Dr. Lynda Goodfellow

In

Byrdine F. Lewis School of Nursing and Health Professions

Georgia State University

Atlanta, Georgia

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ACCEPTANCE

The Thesis: RESPIRATORY THERAPIST’S KNOWLEDGE, SKILLS, AND ATTITUDE & MERS-CoV DISASTER was prepared under the direction of the Master’s Thesis Advisory Committee. It is accepted by the committee members in partial fulfillment of the requirements for the Master’s of Science in by Byrdine F. Lewis School of Nursing & Health Professions at Georgia State University.

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To my family: my father Makmi, my mother Sharifa, my wife Sahar, and my son Faisal.

Your presence is the happiness of my life.
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ABSTRACT

To understand the impact of recurrent pandemics such as MERS-CoV on Respiratory Therapists (RTs) behavior and commitment has become an extremely important and relevant exercise because of the unprecedented MERS-CoV occurrences in Saudi Arabia. The purpose of this study was to assess RTs knowledge, attitudes, and skills, in order to examine the differences in RTs readiness level, training status, and the association and during MERS-CoV disasters.

Method used Cross-sectional survey. A web-link survey was emailed to Saudi Society for Respiratory Care (SSRC) members, (N 750). The survey consisted of two parts: knowledge, skills, and attitudes, and the readiness to come to work. Data was collected and analyzed using SPSS 23.0.

Findings showed a significant difference between the different levels of work positions (p = 0.027), a gender and work position (p = 0.012). There was a significant moderate correlation between readiness to work and knowledge (r = .407, p < 0.05), a significant low correlation between readiness to work and skills (r = 0.261, p = .05). There was a significant substantial correlation between skills and knowledge (r = .521, p < 0.05).

In conclusion, this study showed the importance of establishes effective disaster health bureaucracy by performs periodic health policy analysis for epidemic and pandemic influenza. It called for planning, preparedness to respond effectively using all hazard-approach for potential influenza disasters. It revealed the significance of capability building for first line responders in term of HCWs Check-list education and training programs. Moreover, it supported the establishment of independent local CDC and Disaster Management panel. It recommended flexible bureaucracy and leadership enhancement for HCWs strike teams to increase likelihood success in response for unconventional scenarios.
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DEINITIONS OF TERMS AND VARIABLES

**Pandemic:** Widespread outbreak of a disease.

**Epidemic:** Outbreak of a disease in limited geographical reach.

**Emergency:** An event, usually sudden, that puts at risk the life or well-being of at least one person. Local emergency response resources are adequate to meet the immediate needs of those who are affected by the incident (Bissell, 2013).

**Disaster:** An emergency involving multiple people, of such magnitude that those local response resources are not adequate to meet the immediate needs of those who are affected by the event, requiring that additional resources be brought in from outside jurisdictions. The response is directed/coordinated by personnel from within the jurisdiction where the event occurred, but many of the responders may be from other jurisdictions, increasing the challenge of response coordination (Bissell, 2013).

**Catastrophe:** Use one or a combination of the definitions offered above. The response is from so many different jurisdictions, levels of government, and different kinds of organizations and the needs of the affected population are so diverse and spread out, that no single entity can coordinate it all. Many needs will go unmet, at least in the short run (Bissell, 2013).

**Knowledge:** Source of information and understanding that come from education, to protect Respiratory Therapy and patients contracting MERS-CoV.

**Skill:** The ability of RTs to practice their jobs that come from training and experience during MERS-CoV epidemic.

**Attitude, Behavior:** is the perception of Respiratory Therapists toward protecting themselves from MERS-CoV epidemic.

**Readiness:** The behaviors that guide RTs response during MERS-CoV disaster.
ACRONYMS

RTs: Respiratory Therapists.

CDC: Center for Disease Control.

MOH: Saudi Ministry of Health.

HCWs: Health care workers.

WHO: World Health Organization.

DHHS: Department of Health and Human Services.

MERS-CoV: Middle East Respiratory Syndrome, Corona Virus

SARS: Sever Acute Respiratory Syndrome.

H1N1: Swine Flu virus.

CHAPTER I

Introduction

Since the influenza pandemics have shown disruptive events for the human society, the job of respiratory therapy become fundamental in overcoming such pandemic disasters’ scenarios. Starting from SARS and H1N1 to MERS-CoV, the respiratory therapists (RT) role emerges to be crucial in managing emergency situations. In spite of previous lessons learned from other influenza groups, the MERS-CoV has shown a high level of psychological stress among RTs during the tragedy. This is because of reoccurrence coupled with direct contact and exposure of the healthcare workers when handling the sick persons. Health care workers’ commitment to assigned duties takes precedence. However, RTs who have dealt with suspected patients, specifically with a disease that has an unclear method of transmission, might become an area of great concern.

MERS-CoV is a recent respiratory disease that claimed to be zoonotic, with high possibility of being transmitted from human to human. It is unclear whether or not its origin can be traced in bats or camels. Moreover, it’s not clear if it uses any other sources as a reservoir before transmission to humans. There are several questions that need to be answered before going forward. The disease has an enigmatic reservoir that indicates unclear period of incubation before the symptoms are manifested. Cases of high prevalence have been reported in the Middle East, specifically in Saudi Arabia. The SARS-like diseases, such as MERS-CoV, lacks effective vaccine as well as efficient anti-viral drugs, and its periodic outbreaks in the Middle East, poses a great potential of a dangerous global pandemic crisis (Hilgenfeld & Peiris, 2013).

The MERS-CoV is described as severe pneumonia and renal failure. The illness is caused by a novel coronavirus (CoV) and it was first reported from Saudi Arabia in September 2012.
MERS-CoV patients’ appear with respiratory symptoms, and most of the patients have cardiac, renal, liver and possibly immunosuppression disorders (Assiri et al., 2013), (Al-Tawfiq, 2013).

The Center for Disease Control (CDC) and the World Health Organization (WHO) have declared MERS-CoV a specious virus, with the potential to transmit between human beings; however, there is no sufficient information concerning the source and the method of transmission. During the last decade, the problem was raised from the health care workers who cared for patients suffering from pneumonia in SARS or MERS-CoV diseases, which showed a high level of vulnerability. The health care workers have dealt with cases including some of their work colleagues as patients. At the present time, there is no consistent knowledge about the virus and its susceptibility to the antiviral drugs (Hilgenfeld & Peiris, 2013). Thus far, no efficient and safe vaccine has been discovered for MERS-CoV. On the other hand, no antiviral therapeutic agent has been found effective in treating the disease. In fact, most of cases have received palliative treatments. Similarly, MERS-CoV has augmented the presence of vulnerability within health care society, due to the same issues of the previous SARS disease (Lu, Liu, Du, & Jiang, 2013).

There is evidence for corona viruses spread from human to human. There is a significant increase in numbers of confirmed cases in the Middle East with majority in Saudi Arabia, which warn for a chance of potential wide-ranging pandemic (Chan, Lau, & Woo, 2013). Although infection control measurements, implementations, and enforcement would be needed, the mystery of MERS-CoV with the gap in knowledge of the origin, reservoir and method of transmission are probably overwhelming the health care society. Accordingly, the patients, close family members and the health workers, can experience an emotional stress during that unconventional events, which thereby results from the nature of the disaster (Waugh, 2000).
The panic is a psychological behavior that subsequently results from threat-related beliefs during disasters and catastrophes (Waugh, 2000). It is noticed that behavioral implications of influenza epidemic diseases are population-dependent, which emphasized the importance of an educational intervention to a particular target of the population (Wong & Sam, 2011).

**Purpose**

Hospitals strive to protect and educate their patients, family members, and healthcare workers before and during the crisis. There is confusion resulting from outbreaks of diseases with unknown origin; it is important to study the RTs’ behavior and their response to the assigned duties at the time of crisis to learn lessons for the future. The purpose of this study was to assess the RTs knowledge, attitudes, and skills, in order to examine the differences in RTs readiness level, training status, and the association of their knowledge, skills, and attitudes during MERS-CoV disaster.

**Research questions**

1. What is the readiness level to come to work?
2. Are there any differences between gender, and job level for RTs?
3. What are the differences between trained and non-trained RTs in terms of knowledge, skills and attitudes?
4. Do there an association, if any, between RTs readiness and knowledge, skills and attitudes regarding MERS-CoV disasters?

**Significance of the study**

While the recent studies investigated the profound nature of the disease, there exists a lack of literature investigating the response of the RTs as emergency providers during pandemic influenza. By examining, RTs behavior, and differences between groups. We will able to
understand the limitations of RTs to respond effectively. Also, study the association between the RTs readiness and their knowledge, skills and attitude during MERS-CoV disasters. This study can be important because of lack of literature knowledge in policy evaluation for the Saudi ministry of health MERS-CoV guidelines and policy. It might be important to contribute to the lack of literature knowledge for providers’ reactions toward global pandemic challenges, which is supporting the idea of sharing the responsibilities in the global village society during a pandemic event. As evidenced by previous and recent influenza catastrophes, there is an urgent need for emergency mitigation, preparedness, and planning to respond effectively for future pandemic disasters.

Conclusion

This chapter is an introduction to the MERS-CoV epidemic crisis in Saudi Arabia, and its impact on RTs attitudes and their commitment to come to work. Furthermore, it shows the potential gaps in literature knowledge in first-line emergency health responder’s reactions towards potential pandemic challenges. Finally, it presents an important background, the study purpose, the research questions, and the significance of this study.
CHAPTER II

Literature Review

Introduction

A literature review on RT’s behavior during an epidemic disaster was performed from collection of Georgia State University electronic resource database and search engines: CINHAL, MEDLINE, PUBMED, and GLOBAL HEALTH. For an exhaustive search the research study questions were formulated and the key words used for the research were: healthcare provider and MERS-CoV in Saudi Arabia, healthcare provider and MERS-CoV and Saudi Arabia, MERS-CoV infection and Saudi Arabia, MERS-CoV and Saudi Arabia and healthcare workers, Pandemic and Influenza and Disasters, Panic or Vulnerability and Disasters and Influenza. This chapter will present the background of MERS-CoV, healthcare workers behavior during epidemics, and the available world health plans.

According to Bissell in his work on preparedness and response for catastrophic disasters, influenza is a serious disease that has caused deaths of persons exceeding 30,000 every year with a significant hospitalization rate in U.S (Bissell, 2013). The literature also establishes one week as the period within which the infected persons can fully recover. However, the high fever, respiratory distress, encephalopathy may complicate the situation further leading to possible deaths. According to Bissell, (2013) the first pandemic occurred in 1918 and 1919 and was not as a result of the viruses but from pneumonia, which resulted from a certain opportunistic secondary bacterial infection (Bissell, 2013). The influenza death occurred in elder people with co-morbidity as well as in kids under two years, as the major victims for the virus (Morens, Taubenberger, & Fauci, 2008), sterholm, 2005).
The 1918 - 1919 pandemic influenza was also referred as (Spanish flu) and killed more than 100 million persons around the world. Waves of the virus were highly transmitted among troops during the World War I with major occurrence reported in Spain. According to Bissell, the Spanish flu spread fast and vastly due to the mass movements and assembly of crowded groups who had never been exposed to this type of infection before. He continued to state that pandemic disasters are characterized as unique and can be very disruptive for all human society. In fact the pandemic disasters have a relatively high potential of killing more persons if they are not well managed and controlled (Bissell, 2013). Worse still is the likelihood of a reoccurrence of the major pandemic disaster that claimed millions of lives in the early 1800s. The influenza virus is an airborne, infinite small and extremely dangerous microorganism. Moreover, the influenza virus keeps evolving and mutating in RNA or DNA to produce more generations of resistant viruses that human bodies have not only experienced before but also will not have the ability to recognize the viruses. Such realities and findings prompt the need by emergency planners to understand the psychological fear and behavioral response of the patients, healthcare workers, families of the sick persons and the general human society as a whole. The inevitable fear response by people can impede the coordination process between different jurisdictions during a pandemic disaster response. Since pandemic does not only fall under a single jurisdiction, coordination is paramount. In this context MOH, PH and HCWs would play a crucial role in effective planning, emergency response, and management of recurrent influenza pandemic attacks in the predictable and unpredictable future.

**MERS-CoV**

According to Lu et.al, (2013) MERS-CoV is an emerging infectious epidemic disease that causes severe lower respiratory tract infection in human beings (Lu et al., 2013). Dr. Ali
Mohamed Zaki who served as a virologist at Dr. Fakeeh Hospital in Jeddah first reported MERs-CoV infection on 20th September 2012. The case report by Zaki described a 60-year-old man who suffered from acute pneumonia following renal failure with a fatal outcome. Furthermore, Zaki et al established corona viruses as a possible source of the widespread although there were possibilities to track traces of the viruses in species of mice, horses, whales, birds, and humans. Zaki et al continues to argue that four different corona viruses are known to be endemic in human beings. Unknown corona virus caused the SARS outbreak of 2003. The high frequency of RNA recombination and the large genomes of RNA virus is considered the cause of known and the newly emerging corona viruses. Moreover, Zaki et.al emphasize the risk of further development of newer traits that would allow the viruses’ organism to adapt to various host environment and ecological places possibly resulting to zoonotic events (Zaki et al, 2012).

In support of Lu et.al studies, another study finding emphasizes the fact that MERs-CoV infects broad mammalian species. The Author links the source of MERs-CoV to bats before infections traced in human beings. Nonetheless, the reservoir and the intermediate host of the viruses have not been identified. As such, it is difficult to develop more effective strategies to control the corona viruses and overcome the potential pandemic disaster.

Another study conducted by Haagmans et.al, (2014) that investigated the presence MERS-CoV in camels at a farm in Qatar found the traces of the virus in camels. However, the author recommends caution when using the results as an absolute conclusion to confirm the infection of people from camels, the reason being the mode of transmission of the virus between the persons infected and camels is yet to be established. Haagmans et al, (2014) suggest a 3rd party as a possible source for infection, although the source remains unknown. The availability
of detailed history of exposure cases to animal products can play a crucial role in establishing the risk factors associated with human infections (Haagmans et al, 2014).

Lu et al., show concern in terms of safety for previous SARS-CoV vaccines as the DNA-based vaccines have the potential to induce immunopathology. Furthermore, the receptor-binding domain (RBD) in the SARS-CoV spike protein is more effective and safer than DNA-based vaccines. However Lu et al, reiterate the vaccine might not be effective in the case of its cousin the MERS-CoV, and probably there is a doubt whether these vaccines could help in protection against MERS-CoV. Currently, no effective antiviral therapy that has been discovered however, supportive medical management such as organ support for both respiratory and renal failure is recommended. The findings of a study conducted by Cowden et al, (2010) shows the majority of HCWs strongly believe they are entitled to hazard pay and equal work schedules regardless of gender and marital status and also they should be given priority in receiving vaccines alongside their families. (Cowden et al, 2010). To this extent, the available literature points the need to rethink about a re evaluation of work workforce related concerns and pandemic disasters response policies.

**Healthcare Workers Behavior in Epidemics**

Hazard is “a process that poses a threat to human life or property” (Bissell, 2013). In simple form when hazard factors interact with vulnerability the disaster will occur (Bissell, 2013). The vulnerability has two definitions. First, the definition of social vulnerability states that some individuals in a specific society might be unprepared to disasters as the rest (Bissell, 2013). Second, the holistic definition of vulnerability accepts the social idea but adds that there are countless variables, which make individuals, groups, communities, and nation vulnerable to a disaster (Bissell, 2013).
Disasters can be complex in any given situation; the interaction between hazards and vulnerability would be overwhelming (Bissell, 2013). Therefore, the human activities have a behavior on the attributes of the physical and social environments (Bissell, 2013). Attributes of disaster are identified as liabilities and capabilities (Bissell, 2013). First, the liabilities increase the level of vulnerability by increasing risk exposure, and susceptibility to be harmed (Bissell, 2013). Second, the capabilities are factors that can reduce the vulnerability by increase resistance and resilience to a risk (Bissell, 2013). All four factors in the model interact in complicated ways (Bissell, 2013. However, the Liability and Capability factors are independent on their relationship. Over time, these factors may compound the need for effective plans learned from pandemics which may warrant invention of newer policies with sound rationale and guidelines of practically dealing with such complicated variables (Bissell, 2013).

Bissell (2013) continues to note that even basic public safety will become a challenge especially when HCWs fail to come to work due to a disease, death, family needs, or fear. All these challenging issues place risk on the healthcare quality and perhaps the whole healthcare system during epidemics and pandemics in the future (Bissell, 2013). The increase of the liability and a decrease in capability would result to further vulnerability (2013). Therefore, the emergency responders, such as RTs, are not isolated from their environment, they need to rely on preparedness, and response plans rather than just-in-time response to counter outbreaks of epidemic disasters (Bissell, 2013).

Bringing another substantial issue into focus, Waugh, (2000) states, the first-line emergency responders might show resistance through avoidance behavior in dealing with emergencies and disasters, absent from duty and worst of all change careers. Furthermore, a
mass exit of experienced emergency response workforce will impact the effectiveness of organizations in dealing with different disasters (Waugh, 2000).

Schneider, (2011) describes disasters as a sudden, and significant disruptions that can occur. This occurrence of pandemic disasters disrupts and changes human behavior. People may further develop new norms and behavioral pattern that guide their behaviors in response to a certain unconventional event. Schneider, (2011) continues to explains these newly designed norms which produce conflict between the people and the bureaucratic norms due to the existing difference between the organizational policies and procedures as compared to people selected behavior, which can be described well as an emergency situation or panic attack towards the public.

Schneider, (2011) identifies four basic components of collective behavior during the occurrence of any disaster: Milling, Rumor circulation, Keynoting, and Emergent norms. Firstly, the milling is the phase, which should be dealt with ease and effective behavior. The phase involves expertise and a widespread appropriate behavior. The phase is considered as the most pronounced and most common criteria when organization and intuitional procedures are inadequate, insufficient, and also inappropriate for handling the situation of disaster. This phase may result to complete or could exacerbated breakdowns in communication and transport means. Secondly, rumors are the basic complication-creating factor propelled by the people. It is seen that during milling quit number of new forms of communication and interaction pattern may develop between the populations. Thirdly, Schneider also discusses keynoting as a consequence of milling and rumor process. He states that rumors may change with time to time and create different ideas and thinking in the minds of the viewers which means that different kinds of features and emphasize over the minds of the participants and this may occur suddenly. The
selection of specific ideas, and the concurrent elimination of others, is called “keynoting”. Rumors may appear random or malicious, but are also a means of transmitting critical information about the nature of the disaster within the affected population. The nature of the event and the existence of preexisting ideas can cause keynoting to occur quickly. Keynoting identifies the specific themes and symbols that will eventually give meaning the disruptive situation. Lastly, Schneider, discusses the emerging norms that are known for their dominant symbols and especially the ideas and the key points that emerge; nonetheless, keynoting activity serves as a new set of norms for guiding behavior. These emergent norms help disaster-stricken individuals understand what has happened to them. As the situation stabilizes and pre-disaster conditions are restored, traditional norms come back into play, and emergent norms are discarded (Schneider, 2011).

Seale, Leask, Po, and Macintyre, (2009) conducted a study that discusses the behavior of HCW during pandemics states. On its findings, some HCWs avoided their responsibilities in treating patients during pandemic, although many of them showed willingness to work. The research results establish absenteeism from duty as a common trend resulting from the fear for personal and family safety during pandemic with a possible double infection in an event where a family member gets infected. According to Seale, Leask, Po, & MacIntyre, the ancillary HCWs avoidance behavior is significantly associated with the lack of knowledge concerning pandemic disasters, while the reason for inappropriate work behavior is significantly associated with the perceived seriousness of the pandemic disaster. (Seale, Leask, Po, & MacIntyre, 2009)

Another study done by Hellyyer et.al (2011) discusses the attitude of HCWs in vaccination perception and indicates how the perceptions and attitudes could influence the HCWs decision in protecting themselves during pandemic. The study finds the inaccurate
perception on the side effects of vaccines, is associated with lower rates in vaccination among HCWs. The researchers indicate that the professional norms, information sources, variety of risk perceived may impact the HCWs reaction in response to pandemic plans, and the misconceptions in vaccination sides effects (Helleyer et.al, 2011).

Although a high-mortality of influenza pandemics will not destroy the physical infrastructure, most most of the disaster scientists agree it could massively affect the human infrastructure, which are the capital assets for all the human needs such as: healthcare, banking, transportation, energy services, security services and food services (Bissell, 2013). Furthermore, in case of a severe pandemic outbreak scenario, the government might apply extreme isolation policies to minimize spreading the disease, which could shut down the delivery of human services. The situation may become worse, when there is vulnerability among the HCWs from a pandemic disaster, with predicted shortage in trained healthcare personnel. On such basis, Bissell, argues that there might be an association between the vulnerability and the lack of work commitment when the healthcare personnel fail to show up to work as a result of the fear of being exposed to the disease. As such, the finding underscores the critical nature of the consequences of pandemic disasters, and the significant impact to the human fabric (Bissell, 2013).

Schneider, (2011) discusses two distinct sets of norms that guide human behavior response during a disaster. On the one hand, bureaucratic norms provide the foundation for the governmental response system in terms of policy and procedure. On the other hand, emergent norms serve to structure behavior within the affected population. Both are necessary, but they may not be consistent with one another. If they are not, there can be serious consequences for the entire relief effort. According to the author, the gap between bureaucratic and emergent norms
during disasters may lead to management crisis and lots of disturbance may occur in order to make people safe and stay away from performing their own selected behavior, which is not the part of bureaucracy’s procedures and policies. The size of the gap between emergent and bureaucratic norms may have a direct influence on the success of the disaster response process. The bureaucratic norms may include response to disaster, which are replaced by social responses in emergent conditions. Schneider continues to state that the norms includes explicit objectives, which may comprise of mitigation, preparedness, and response (Schneider, 2011).

According to Seale, Leask, Po, & MacIntyre, (2009) HCWs should be targeted in educational and training programs including psychological concerns. HCWs should participate in pandemic planning: communications in resources logistics and planning, and have priority for accessing the national stockpile for their family, which would increase the level of staff confidence in the time of pandemic disasters. Seale, Leask, Po, & MacIntyre, (2009) emphasize that unwilling of health department employee’s to report to their work stations may become a threat to the national emergency health care response infrastructure. The researchers declare that addressing these issues is significance because of the vital HCWs roles in ensuring an effective response in health care organizations. (Seale, Leask, Po, & MacIntyre, 2009)

Available World Health Plans

World Health Organization (WHO) plan

The WHO strives to implement an early warning and response guidelines for global pandemic, especially influenza that killed millions in Europe in the last century. WHO focus its efforts on: virus properties, population vulnerability, subsequent waves of spread, healthcare system capacity, and current situation assessment (“WHO | Assessing the severity of an influenza pandemic,” n.d.).
Pandemic scenarios are unique and could not be predicted as easy as some natural disasters, the HCWs including RTs and other teams needs to be aware about the WHO alert tool, and the severity of the a pandemic intensity which more often will be in an ordinal scale of 1-6. The six WHO alert phases are:

1. Low risk of human cases.
2. Higher risk of human cases.
3. Not any, or very limited, human-to-human transmission.
4. Evidence of increased human-to-human transmission.
5. Evidence of significant human-to-human transmission.
6. Efficient and sustained human-to-human transmission

Bissell, (2013) states, this tool can measure the pandemic intensity phases and its transmission method, which is an effort made by expert of public health PH in up-to-date basis and when applying this step the HCWs should be able to infer the stage of the influenza issue (Bissell, 2013).

**United States Department of Health and Human Services (DHHS) plan**

The US. Department of Health and Human Services (DHHS) has a fundamental role in mitigation planning, response, and recovery during pandemics. It collaborates with WHO and CDC in implementing a national strategy for potential pandemics. Since the WHO alert phases tool is significant for the process of planning, the DHHS includes it on its planning process. The DHHS is responsible for all coordination of Public Health (PH) and emergency response during pandemics. It has guidance in infection control measurement, treatment strategies to all US entities, and public. It is responsible for prioritization and distribution of vaccines, national stockpile, and personal protective equipment’s as counter-measurements. It has a responsibility
in ongoing epidemiologic assessment, research in the influenza virus, and rapid diagnostics (HHS, n.d.).

**Saudi Ministry of Health (MOH) plan**

The Scientific Advisory Council formed by acting Minister of Health, Engineer Adel Fakeh, calls for the urgent need to develop evidence-based recommendations. On June 2014, it developed its 1st Edition, for safe care of patients with suspected, probable, or confirmed MERS-CoV infection. The guidelines were a modification efforts of the Council members who carried out the revision for the previous WHO and CDC guidelines (“Coronavirus Website - Ministry of Health,” n.d.).

**Guidelines for MERS-CoV patients**

Following several studies conducted in Saudi Arabia, the researchers detected high concentrations of MERS-CoV nucleic acids in nasal swabs of camels through recovering virus through culture. Over time, high prevalence of the corona viruses has been reported frequently in camels and not other animals domesticated. As such, it is important to take into concern the epidemiological impact of the period within which human came into contact with the suspected MERs-CoV infection. The contact may either be direct through coming into contact with camels or indirect where a patient comes in contact with a healthy person. In addition, cases of humans transmitting the corona virus to others are well documented. In other words, contact history with the virus or ill patient suffering from acute respiratory illness provides an important epidemiological clue to suspecting MERS-CoV infections. The first version of the guidelines that existed previously which were formulated by scientific advisory council in 2014 required the adoption of standard contact precaution in general for sick people who are already confirmed as suffering from corona viruses or suspected to having the infection. In addition, for those who
required aerosol procedures or critically sick, the advisory council recommended airborne precautions for such categories.

The second version of the guidelines, which was developed after re-evaluation in December of 2014 upgraded the isolation precaution as a standard measure and resorted to airborne precautions for each category ("Coronavirus Website - Ministry of Health," n.d.). However in the absence of negative pressure rooms’ scenarios, the council recommended that the sick persons be placed in properly ventilated room with a filter put on to the maximum operating capacity and placed near the sick persons beds. Also a sealed mask should be worn when entering the room of a suspected patient (MOH, 2014).

The re-evaluation of standard precautions to the second version was as a result of the following reasons:

1. Some of the patients and Health workers were infected without direct contact with the corona viruses’ patients. Besides, the possibility of airborne transmission cannot be ruled out completely considering the contamination of the environment or droplet transmission among other likely transmission routes (MOH, 2014).

2. One recent study findings confirmed traces of MERS-CoV RNA in samples of air that were collected from a camel barn of camels infected with the virus (MOH, 2014).

3. Another study that was carried out by the council established that healthcare workers who use surgical masks when attending to MERS-CoV virus are more exposed as compared to those who use N95 respirators (MOH, 2014).

4. The High mortality and morbidity rates related with the corona viruses (MOH, 2014).

5. The unknown modes and routes of transmission in humans (MOH, 2014).
6. The lack of chemoprophylaxis or a vaccine and the fact that many cases require aerosol generated procedures (MOH, 2014).

Nonetheless, the most recently revised guidelines for corona patients; the council recommends a certain minimum distance between the sick people beds in a number of hospital units, seal checks as well as fit and test (MOH, 2014). For the lack of experience in dealing with epidemic influenza emergencies, the WHO guidelines drive the Saudi Arabian plan.

**Summary of literature review**

The in-depth review of available literature not only identifies the challenges and describe the mitigation efforts but also underscores the need for further formulation and evaluation of epidemic disaster’s mitigation, preparedness and response policies as well as the review of the workforce related issues that, greatly affects their behavioral response and commitment particularly when responding to unprecedented disasters like the MERS-CoV.
CHAPTER III
Methodology

Introduction

This chapter describes the methods used to answer the research questions. There are four questions that need to be answered by the survey. First, the research questions will be presented. Second, the methods used to collect data included: Cross-sectional survey, which is organized under: study participants, research instrument, procedure, and data analysis.

The research questions are:

1. What is the readiness level to come to work?
2. Are there any differences between gender, and job level for RTs?
3. What are the differences between trained and non-trained RTs in terms of knowledge, skills and attitudes?
4. Do there an association, if any, between RTs readiness and knowledge, skills and attitudes regarding MERS-CoV disasters?

Study Participants

All subjects were RTs working in Saudi Arabia who were members of the Saudi Society for Respiratory Care (SSRC). A total of 750 participants had the same chance to receive as emailed confidential survey through the directory of SSRC. The inclusion criteria were members of the SSRC. The exclusion criteria were SSRC student’s members who never graduated or worked in hospitals.

Research Instrument

The survey for this study was developed by the student researcher and emailed to the thesis’s advisor and committee members to test for content and face validity. The survey
includes demographic questions, yes/no questions, Likert-scale with four-level Likert items, and comments section added at the end of the survey. After approval, the research proposal was sent to the institutional review board (IRB). The survey consisted of 32 questions. The questions were designed to assess RTs knowledge, skills, and attitudes in order to examine the association with MERS-CoV disaster in Saudi Arabia. All the questions used in the questionnaire were drafted from two previously published studies that assess health care workers knowledge, skills and attitude during pandemic influenza (Seale, Leask, Po, & MacIntyre, 2009) and (Xiaochun Ma et al., 2011). Permission to use both survey questionnaires was granted. The survey used in this study can be viewed in Appendix-1.

**Procedure**

Following IRB’s approval an email was sent for the chair of Saudi Society of Respiratory Care (SSRC) and requested consent to administer the questionnaire. A cover letter introduced the study to participants during spring semester of 2015, and asked them to participate. The survey ended after two weeks from first day of distribution. A reminder email was sent to the participants after one week to remind participants to complete the survey.

**Data Analysis**

Data was analyzed using SPSS 23.0. Descriptive statistics included percentage and frequency to evaluate the RT’s response to the survey questions. Factorial ANOVA were used to examine the difference between: gender and work status. Multivariate analysis of variance (MANOVA) was used to examine the difference between trained and non-trained RTs in terms of knowledge, skills, and attitude. Correlation coefficient was used to measure association between RTs readiness level, and knowledge, skills and attitude during MERS-CoV disaster, and
the magnitude of correlations between variables was interpreted using Davis conventions (Davis, 1971). To establish significance a p value (< 0.05) was used.

Summary of Methodology

The questionnaire was used to examine the Respiratory Therapists’ Knowledge, Skills, and Attitude & MERS-CoV Disaster. A web-link survey was emailed to Saudi Society for Respiratory Care (SSRC) members with a total number of 750 members. The survey consisted of two parts: knowledge, skills, and attitudes, and the readiness to come to work.
Chapter IV

Results

Introduction

This chapter represents the findings in order to answer the following research questions:

1. What is the readiness level to come to work?

2. Are there any differences between gender, and job level for RTs?

3. What are the differences between trained and non-trained RTs in terms of knowledge, skills and attitudes?

4. Do there an association, if any, between RTs readiness and knowledge, skills and attitudes regarding MERS-CoV disasters?

Sample population

Seven hundred and fifty surveys were emailed and 192 subjects responded, which yielded a 74% response rate (“Sample Size Determination Using Krejcie and Morgan Table,” n.d.). Five respondents were eliminated because they were students or medical doctors. The final respondents count was 187. A majority of the respondents were married (55%), male (70%), Respiratory Therapist (64%), working in hospital size more than 400 beds (35%), and living with their spouse and children (43%). Mean age for the respondents was 31 (SD= 6.04). Table 1 presents demographic frequencies and percentages for the respondents.
Table 1 Frequency and Percentages for Sample Demographics

<table>
<thead>
<tr>
<th>Demographic</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>47</td>
<td>25</td>
</tr>
<tr>
<td>Male</td>
<td>132</td>
<td>70.2</td>
</tr>
<tr>
<td>No Response</td>
<td>8</td>
<td>4.8</td>
</tr>
<tr>
<td>Hospital Bed Size</td>
<td></td>
<td></td>
</tr>
<tr>
<td>50-100 Beds</td>
<td>10</td>
<td>5.3</td>
</tr>
<tr>
<td>100-200 Beds</td>
<td>18</td>
<td>9.6</td>
</tr>
<tr>
<td>200-300 Beds</td>
<td>45</td>
<td>23.9</td>
</tr>
<tr>
<td>300-400 Beds</td>
<td>47</td>
<td>25.0</td>
</tr>
<tr>
<td>&gt; 400 Beds</td>
<td>65</td>
<td>34.6</td>
</tr>
<tr>
<td>No Response</td>
<td>2</td>
<td>1.6</td>
</tr>
<tr>
<td>Marital Status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>76</td>
<td>40.4</td>
</tr>
<tr>
<td>Married</td>
<td>104</td>
<td>55.3</td>
</tr>
<tr>
<td>No Response</td>
<td>7</td>
<td>4.3</td>
</tr>
<tr>
<td>Job Position</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Respiratory Therapist</td>
<td>121</td>
<td>64.4</td>
</tr>
<tr>
<td>Respiratory Supervisor</td>
<td>39</td>
<td>20.7</td>
</tr>
<tr>
<td>Clinical Instructor/Educator</td>
<td>8</td>
<td>4.3</td>
</tr>
<tr>
<td>RT Manager</td>
<td>14</td>
<td>7.4</td>
</tr>
<tr>
<td>No Response</td>
<td>5</td>
<td>3.2</td>
</tr>
<tr>
<td>Living Status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Living with Parents</td>
<td>59</td>
<td>31.4</td>
</tr>
<tr>
<td>Living with Children</td>
<td>15</td>
<td>8.0</td>
</tr>
<tr>
<td>Living with Spouse and Children</td>
<td>80</td>
<td>42.6</td>
</tr>
<tr>
<td>Living Alone</td>
<td>28</td>
<td>14.9</td>
</tr>
<tr>
<td>No Response</td>
<td>5</td>
<td>3.2</td>
</tr>
</tbody>
</table>

Note: Due to missing data, some answers do not= 100%. n=187

Attitudes, Knowledge, Skills and Readiness Level

Mean and Standard Deviations were calculated to describe the Attitudes, Knowledge, Skills, and Readiness Level see Table 2. The Attitude $\bar{x}$ is 10.6 (SD=3.12); the RTs show more avoidant behavior towards their duties but with low “coefficient alpha” ($\alpha$) = .37 that shows lower reliability. The Knowledge $\bar{x}$ is 13.84 (SD=3.12); the RTs have moderate knowledge
towards MERS-CoV with $\alpha = .80$ that shows a strong reliability. The skills $\bar{x}$ is 14.47 (SD=2.26); the RTs show low skills but with $\alpha = .25$ that indicates low reliability.

**Table 2** Means, Standard Deviations, and Cronbach's Alpha ($\alpha$) Reliabilities for the Three Composite Scores

<table>
<thead>
<tr>
<th>Score</th>
<th>$\bar{x}$</th>
<th>$SD$</th>
<th>No. of Items</th>
<th>$\alpha$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge</td>
<td>13.84</td>
<td>3.12</td>
<td>5</td>
<td>.80</td>
</tr>
<tr>
<td>Skills</td>
<td>14.47</td>
<td>2.26</td>
<td>8</td>
<td>.25</td>
</tr>
<tr>
<td>Behavior/Attitude</td>
<td>10.06</td>
<td>1.17</td>
<td>7</td>
<td>.37</td>
</tr>
<tr>
<td>Readiness Level</td>
<td>2.32</td>
<td>1.52</td>
<td>5</td>
<td>.65</td>
</tr>
</tbody>
</table>

**Note:** It was not possible to compare coefficient $\alpha$ with the original sources. Therefore, comparisons were not possible.

**Readiness Level to Come to Work and RTs Gender, and Job Position**

A factorial ANOVA was conducted to compare the effect of the Gender (Male, Female) and Work Position (Respiratory Therapist, Respiratory Supervisor, Clinical Instructor/Educator, and RT Manager) on participants Readiness to work, see Table 3.

The main effect of Gender yield on F ratio of, $F (1, 161) = 0.959$, $p = 0.329$ indicating there was no significant difference between male ($\bar{x}= 2.93$, SD= 1.75) and female ($\bar{x}= 2.02$, SD= 1.63) readiness to work.

The second main effect of Work Position yielded a F ratio of, $F (3, 161) = 3.15$, $p = 0.027$ indicating there was significant difference between the different level of work positions. A “Least Significant Difference” (LSD) post-hoc analysis was conducted see Table 4, and there was a significant $\bar{x}$ difference between Clinical Instructor/Educator ($\bar{x}= 3.85$), Respiratory supervisor ($\bar{x}= 2.57$) and Respiratory Therapist ($\bar{x}= 2.67$). The Clinical Instructor/Educator had more willingness to work compared to the Respiratory Supervisor and Respiratory Therapist, (p
= 0.008). However, there is no significant \( \bar{x} \) difference between RT Manager and any of other work positions \( (p = 0.312, p = 0.306, p = 0.292) \).

There was significant interaction between Gender and Work Position, \( F (3, 161) = 3.74, p = 0.012 \). The Female Clinical Instructor/Educator \( (\bar{x} = 6.00) \) and Female RT Managers \( (\bar{x} = 4.00) \) have the highest significance for willingness to work in comparison to Male RT Managers \( (\bar{x} = 2.63) \) Male Respiratory Therapist \( (\bar{x} = 3.09) \), and Male Clinical Instructor/Educator \( (\bar{x} = 3.00) \). However, Female Respiratory supervisor \( (\bar{x} = 1.74) \) and Respiratory Therapist \( (\bar{x} = 2.00) \) in comparison to their Male counter part had the lowest willingness to work, see Figure 1.

**Table 3** Factorial Analysis of Variance for Readiness level to come to work and RTs Gender

<table>
<thead>
<tr>
<th>Source</th>
<th>Type III Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corrected Model</td>
<td>70.279*</td>
<td>7</td>
<td>10.040</td>
<td>3.601</td>
<td>.001</td>
</tr>
<tr>
<td>Intercept</td>
<td>306.315</td>
<td>1</td>
<td>306.315</td>
<td>109.855</td>
<td>.000</td>
</tr>
<tr>
<td>Gender</td>
<td>2.675</td>
<td>1</td>
<td>2.675</td>
<td>.959</td>
<td>.329</td>
</tr>
<tr>
<td><strong>Work Position</strong></td>
<td><strong>26.358</strong></td>
<td><strong>3</strong></td>
<td><strong>8.786</strong></td>
<td><strong>3.151</strong></td>
<td><strong>.027</strong></td>
</tr>
<tr>
<td><strong>Gender * Work Position</strong></td>
<td><strong>31.346</strong></td>
<td><strong>3</strong></td>
<td><strong>10.449</strong></td>
<td><strong>3.747</strong></td>
<td><strong>.012</strong></td>
</tr>
<tr>
<td>Error</td>
<td>448.928</td>
<td>161</td>
<td>2.788</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1755.000</td>
<td>169</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrected Total</td>
<td>519.207</td>
<td>168</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\( n=187 \)

*p value=0.05
### Table 4 Post hoc Analysis for Factorial ANOVA

<table>
<thead>
<tr>
<th>Work Position</th>
<th>Mean Difference (I-J)</th>
<th>Std. Error</th>
<th>Sig.</th>
<th>95% Confidence Interval for Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respiratory Therapist</td>
<td>.084</td>
<td>.435</td>
<td>.848</td>
<td>-.776 to .943</td>
</tr>
<tr>
<td>Respiratory Supervisor</td>
<td>-2.083*</td>
<td>.719</td>
<td>.004</td>
<td>-3.503 to -.663</td>
</tr>
<tr>
<td>Clinical Instructor/Educator</td>
<td>-.901</td>
<td>.889</td>
<td>.312</td>
<td>-2.656 to .853</td>
</tr>
<tr>
<td>RT Manager</td>
<td>-1.901</td>
<td>.889</td>
<td>.312</td>
<td>-2.656 to .853</td>
</tr>
<tr>
<td>Respiratory Therapist</td>
<td>-2.083*</td>
<td>.719</td>
<td>.004</td>
<td>-3.503 to -.663</td>
</tr>
<tr>
<td>Respiratory Supervisor</td>
<td>2.083*</td>
<td>.719</td>
<td>.004</td>
<td>.663 to 3.503</td>
</tr>
<tr>
<td>Clinical Instructor/Educator</td>
<td>2.167*</td>
<td>.805</td>
<td>.008</td>
<td>.576 to 3.757</td>
</tr>
<tr>
<td>RT Manager</td>
<td>1.182</td>
<td>1.117</td>
<td>.292</td>
<td>-1.025 to 3.388</td>
</tr>
<tr>
<td>Respiratory Therapist</td>
<td>.901</td>
<td>.889</td>
<td>.312</td>
<td>-.853 to 2.656</td>
</tr>
<tr>
<td>Respiratory Supervisor</td>
<td>.985</td>
<td>.960</td>
<td>.306</td>
<td>-.910 to 2.880</td>
</tr>
<tr>
<td>Clinical Instructor/Educator</td>
<td>-1.182</td>
<td>1.117</td>
<td>.292</td>
<td>-3.388 to 1.025</td>
</tr>
</tbody>
</table>

p value = 0.05
Figure 1 Estimated Marginal $\bar{x}$ of RTs Readiness to come to work

### Differences between trained and non-trained RTs in terms of knowledge, skills and attitude

A multivariate ANOVA was conducted with three dependent variables and one independent variable. The independent variable is training (Training, Non-training). The dependent variables are compost scores of Knowledge, Skills, and Attitude. There was no significant effect between training level and total attitudes score, $F (1,170) = 1.67, p = 0.198$. There was a significance between training level and total Skills score, $F (1,170) = 4.32, p = 0.039$. There was a significance between Training level and total Knowledge score, $F (1,170) = 20.35, p < 0.001$. Participants, who have attended Training program, have higher skills scores...
than who have not attended Training program (\( \bar{x} = 14.26 \)). Participants, who have attended Training program, have higher Knowledge scores (\( \bar{x} = 15.40 \)) than who have not attended Training program (\( \bar{x} = 13.17 \)) see Table 5.

**Table 5** MANOVA of Training against Attitude, Skills, and Knowledge scores

<table>
<thead>
<tr>
<th>Source</th>
<th>Dependent Variable</th>
<th>Type III Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corrected Model</td>
<td>Attitude</td>
<td>2.397(^a)</td>
<td>1</td>
<td>2.397</td>
<td>1.671</td>
<td>.198</td>
</tr>
<tr>
<td></td>
<td>Skills</td>
<td>22.079(^b)</td>
<td>1</td>
<td>22.079</td>
<td>4.320</td>
<td>.039</td>
</tr>
<tr>
<td></td>
<td>Knowledge</td>
<td>180.226(^c)</td>
<td>1</td>
<td>180.226</td>
<td>20.346</td>
<td>.000</td>
</tr>
<tr>
<td>Intercept</td>
<td>Attitude</td>
<td>14549.793</td>
<td>1</td>
<td>14549.793</td>
<td>10141.333</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>Skills</td>
<td>31138.405</td>
<td>1</td>
<td>31138.405</td>
<td>6092.115</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>Knowledge</td>
<td>29630.946</td>
<td>1</td>
<td>29630.946</td>
<td>3345.141</td>
<td>.000</td>
</tr>
<tr>
<td>Q4</td>
<td>Attitude</td>
<td>2.397</td>
<td>1</td>
<td>2.397</td>
<td>1.671</td>
<td>.198</td>
</tr>
<tr>
<td></td>
<td>Skills</td>
<td>22.079</td>
<td>1</td>
<td>22.079</td>
<td>4.320</td>
<td>.039</td>
</tr>
<tr>
<td></td>
<td>Knowledge</td>
<td>180.226</td>
<td>1</td>
<td>180.226</td>
<td>20.346</td>
<td>.000</td>
</tr>
<tr>
<td>Error</td>
<td>Attitude</td>
<td>243.899</td>
<td>170</td>
<td>1.435</td>
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<td></td>
</tr>
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<td></td>
<td>Skills</td>
<td>868.915</td>
<td>170</td>
<td>5.111</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Knowledge</td>
<td>1505.844</td>
<td>170</td>
<td>8.858</td>
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</tr>
<tr>
<td>Total</td>
<td>Attitude</td>
<td>17667.000</td>
<td>172</td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Skills</td>
<td>37025.000</td>
<td>172</td>
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<tr>
<td></td>
<td>Knowledge</td>
<td>34674.000</td>
<td>172</td>
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<tr>
<td>Corrected Total</td>
<td>Attitude</td>
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<td>Skills</td>
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<td>Knowledge</td>
<td>1686.070</td>
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</tr>
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</table>
**The association between RTs Readiness and knowledge, Skills and Attitude**

**Correlation**

A Pearson R correlation was conducted to investigate the association between Knowledge, Skills, and Attitude with RTs Readiness to work. There was a significant positive moderate correlation between Readiness to work and Knowledge, r = .407, p < 0.05. As the RTs Knowledge increases their Readiness to come to work increases. There was a significant positive low correlation between Readiness to work and Skills, r = .261, p = 0.05. As the RTs Skills increases their Readiness to work increases but the relationship is weak. There was a significant positive substantial correlation between Skills and Knowledge, r = .521, p< 0.05. As the RTs Knowledge increases their Skills increase see Table 6.

**Table 6 Pearson Correlation RTs Readiness and Knowledge, Skills, and Attitudes**

<table>
<thead>
<tr>
<th></th>
<th>Readiness</th>
<th>Attitude</th>
<th>Skills</th>
<th>Knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Readiness</td>
<td>Pearson Correlation</td>
<td>1</td>
<td>.134</td>
<td>.261*</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.077</td>
<td>.001</td>
<td>.000</td>
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<td>.941</td>
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*. Correlation is significant p value=0.05 level (2-tailed)
Summary of the findings

There is no significant difference between male and female in readiness to work. There is significant difference between the different levels of work positions. The Clinical Instructor/Educator has more willingness to work comparing to Respiratory Supervisor and Respiratory Therapist. However, there is no significant mean difference between RT Manager and any of other work positions. There is significant interaction between Gender and Work Position. The Female Clinical Instructor/Educator and Female RT Managers have the highest significance for willingness to work in comparison to Male RT Managers Male Respiratory Therapist, and Male Clinical Instructor/Educator. However, Female Respiratory supervisor and Respiratory Therapist in comparison to their Male counter part have the lowest willingness to work. There was no significance effect between training level and total Attitude score. Participants, who have attended training program, have higher skills scores than who have not attended training program. Participants, who have attended training program, have higher knowledge scores than who have not attended training program. There was a significant positive moderate correlation between Readiness to work and Knowledge. There was a significant positive low correlation between Readiness to work and Skills. There was a significant positive substantial correlation between Skills and Knowledge.
CHAPTER V

Discussions

This chapter discusses the research results and findings of the research questions. The research questions:

1. What is the readiness level to come to work?
2. Are there any differences between gender, and job level for RTs?
3. What are the differences between trained and non-trained RTs in terms of knowledge, skills and attitudes?
4. Do there an association, if any, between RTs readiness and knowledge, skills and attitudes regarding MERS-CoV disasters?

A discussion of findings reviewed by the implications, limitations, recommendations for future study, and conclusion will be presented.

Readiness Level to Come to Work and RTs Gender, and Job Position

The first and second research questions, the readiness level to come to work is vital for effective organizations, and within the context of knowledge, skills, and attitude, it was clear that there was no significance difference between different genders. But, it is not surprising to have a significant difference between the different levels of work positions. The more capability in terms of knowledge and skills, such as clinical instructor, you have the more willing to come to work (Bissell, 2013). The Clinical-Educator (M= 3.85) had more willingness to work compared to the RT supervisor and RTs not managers had no differences among all job positions. The first line-responders show less willingness to work. It is supported by (Bissell, 2013) study, which emphasized the importance of increasing the capabilities of emergency first-line responders, and call for promote the capability and reduce the liability to further decrease the vulnerability of the
emergency responders. The RTs could show a resistance through their avoidance behavior in dealing with MERS-CoV disaster, absent from duty and worst of all change careers, which is consistent with Waugh, (2000) study. The results are also consistent with the study of Seale, Leask, Po, & MacIntyre, (2009), which emphasizes that unwilling of health department employee’s to report to work might become a threat to the national emergency health care response infrastructure, and there is a consistent with the same study, that asserts that HCWs avoidance behavior is significantly associated with the lack of knowledge concerning pandemic disasters.

**Differences between trained and non-trained RTs in terms of knowledge, skills and attitude**

The third research question, “What is the difference between trained and non-trained RTs in terms of knowledge, skills and attitudes?” The training program was important to seek of capability building RTs during epidemic emergency. There was significance between Training level and total Knowledge score, (p < 0.05), which is consistent with Seale, Leask, Po, & MacIntyre, (2009). However, there was not a significance effect between training level and total attitude score, (p = .198), which is inconsistent with the Seale, Leask, Po, & MacIntyre, (2009) study but the results are still consistent with study Bissell, (2013). The results controversy are because of different prospective of different professions, which support the importance of emergency management consultation during epidemic disaster planning. There was significance between training level and total skills score, (p = .039). It is clear that RTs who attended training programs have more skills than those did not attend training program, which is supported by (Bissell, 2013).
The association between RTs Readiness and knowledge, Skills and Attitude

The fourth research question, “Do there an association, if any, between RTs readiness and knowledge, skills and attitudes regarding MERS-CoV disasters?” It investigated the Saudi RTs readiness within the context of knowledge, skills, and attitude. The findings show a positive moderate correlation between Readiness to work and Knowledge, \( r = .407, p < 0.05 \), which is supported by (Seale, Leask, Po, & MacIntyre, 2009) study. As the RTs Knowledge increases their Readiness to come to work increases. The findings show positive low correlation between readiness to work and skills, \( r = .261, p = .05 \). It is consistent with Seale, Leask, Po, & MacIntyre, (2009) that the reason for inappropriate work behavior is significantly associated with the perceived seriousness of the pandemic disaster. As the RTs skills increases the readiness to work increases but the relationship is weak. It is consistent with Hellyyer et.al, (2011), which asserts that the professional norms, information sources, variety of risk perceived may influence the HCWs response to pandemic plans. The findings show there was a significant positive substantial correlation between skills and knowledge, \( r = .521, p< 0.05 \). As the RTs knowledge increases, their skills increase, which is consistent with (Hellyyer et.al, 2011) and (Seale, Leask, Po, & MacIntyre, 2009).

Implications

It is believed this population has not been studied before within the context of epidemic influenza emergencies and disasters. These results could become useful to health policy makers because it participates in evaluating the MOH guidelines and policy for MERS-CoV epidemic disasters. More flexible bureaucracy, coordination versus command, and enhancement to the role of leadership in health care system is needed. Furthermore, these results would help to engage the (Faith-based organization) Red Crescent and Red Cross; by offering education and training
programs for HCW Check-list. These results might show the necessity for establishing an independent Disaster Management panel, which might increase community capabilities, and offer consultation, mitigation, preparedness, and response strategies. Finally, these results could show the need to establish an independent Public Health body (local CDC) for the role of measures taking, risk analysis, capability enhancement for effective response.

**Future Directions**

Replication of the study, and retesting and modifying the survey tool is highly recommended. Rethink MOH healthcare policy and plans for different epidemic emergencies and disasters in terms of forms of flexible bureaucracy, the coordination versus command is highly recommended. Investigate the role of the (Faith-based organization) Red Crescent and Red Cross role in offering “influenza epidemic and pandemic scenarios” education and training in terms of HCWs Check-list is highly recommended. Study the potential gap between policy and procedure (bureaucratic norms), and emergent norms in guiding HCWs behavior during response to epidemic and pandemic emergencies and disasters and the importance of leadership in minimizing this potential gap is highly recommended. Study RTs potential role as healthcare officials in emergency mitigation, planning, preparedness, and response for potential influenza disasters is recommended.

**Limitations**

This study was a Cross-Sectional design, and the survey questions have been adapted to measure the variables of the targeted population. There was limited available of survey questionnaire and no calculations for reliability. The SSRC email directory, and email uses issues. Limited survey availability with no data of reliability of survey.
Conclusion

This study showed the importance of establishes effective disaster health bureaucracy by performs periodic health policy analysis for epidemic and pandemic influenza. It called for planning, preparedness to respond effectively using all hazard-approach for potential influenza disasters. It revealed the significance of capability building for first line responders in term of HCWs Check-list education and training programs. It recommended coordination rather than command by engaging multi-partners such as (Faith-based organizations) Red Crescent and Red Cross in the Check-list education and training programs. Moreover, it supported the establishment of independent local CDC and Disaster Management panel for measures taking and consultation. It recommended flexible bureaucracy and leadership enhancement for HCWs strike teams, which help in improvisation, creativity, and increase likelihood success in response for unconventional scenarios. Finally, it suggested study RTs potential role as healthcare officials in emergency mitigation, planning, preparedness, and response for potential influenza disasters.
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http://doi.org/10.1016/j.antiviral.2013.08.015


APPENDIX 1: Survey Questionnaire

Introduction:

This survey aims to assess Respiratory Therapists’ knowledge, skills, and attitude, in order to examine the association with MERS-CoV disaster in Saudi Arabia. In addition, it aims to investigate the impact of Ministry of Health MOH guidelines on that behavior. The importance of the survey is to contribute in supporting the lack of literature knowledge in the health care providers’ reaction toward the global pandemic challenges, which is supporting the idea of sharing the responsibilities in the global village society during a pandemic event.

Survey Questions:

1. Have you received vaccination for seasonal influenza in 2014-2015?
   a. Yes (Skip to question 3)
   b. No (Please answer question 2)

2. If you did not receive vaccination for 2015 influenza, what is the major reason? (Multiple choices are allowed)
   a. Majority of patients with MERS-CoV influenza experience mild and self-limited course of disease
   b. I have contraindication for vaccination
   c. I have serious concern about the safety of influenza vaccination
   d. I have serious concern about the efficacy of influenza vaccination
   e. Others: _________________________
3. Have you had experience treating or caring for patients with MERS-CoV influenza?
   a. Yes
   b. No

4. Where you are employed, has your organization offered training program on MERS-CoV influenza?
   a. Yes
   b. No

5. Have you completed a training program on MERS-CoV influenza before caring for patients with MERS-CoV?
   a. Yes
   b. No

6. You understand the relevant knowledge of MERS-CoV influenza.
   a. Completely agree
   b. Agree
   c. Disagree
   d. Completely disagree

7. The source of your knowledge about MERS-CoV influenza include: (multiple choices are allowed)
   a. Television
   b. Newspaper
   c. Internet
   d. Medical journals
   e. Hospital training program
f. Others: ________________

8. You are confident that you understand risks of MERS-CoV influenza for the patients and healthcare workers.
   a. Completely agree
   b. Agree
   c. Disagree
   d. Completely disagree

9. You are confident that you understand how to protect yourself and patients during MERS-CoV influenza pandemic.
   a. Completely agree
   b. Agree
   c. Disagree
   d. Completely disagree

10. Hand hygiene includes washing hands with soap and water, or the use of an alcohol-based hand rub.
    a. Completely agree
    b. Agree
    c. Disagree
    d. Completely disagree.

11. Where you are employed all recommended personal protective equipment (PPE) is readily available in areas where MERS-CoV influenza patients are being treated.
    a. Completely agree
    b. Agree
12. Respiratory therapy supervisors or attending physicians remind you if you do not use PPE when caring for patients with MERS-CoV influenza
   a. Completely agree
   b. Agree
   c. Disagree
   d. Completely disagree

13. You know when your patients are on influenza precautions
   a. Completely agree
   b. Agree
   c. Disagree
   d. Completely disagree

14. My colleagues often forget to use recommended PPE when taking care of patients with MERS-CoV influenza
   a. Completely agree
   b. Agree
   c. Disagree
   d. Completely disagree

15. I will remove my PPE immediately before I leave MERS-CoV patients room
   a. Completely agree
   b. Agree
   c. Disagree
d. Completely disagree

16. I often forget to change PPE between patients when taking care of patients with MERS-CoV
   a. Completely agree
   b. Agree
   c. Disagree
   d. Completely disagree

17. Use of PPE will protect healthcare workers from getting MERS-CoV influenza
   a. Completely agree
   b. Agree
   c. Disagree
   d. Completely disagree

18. Use of PPE will protect patients from getting MERS-CoV influenza
   a. Completely agree
   b. Agree
   c. Disagree
   d. Completely disagree

19. It is inconvenient to use recommended PPE when taking care for patients with MERS-CoV influenza
   a. Completely agree
   b. Agree
   c. Disagree
   d. Completely disagree

20. Use of recommended PPE interfere with patient treatment
a. Completely agree
b. Agree
c. Disagree
d. Completely disagree

21. Are you willing to treat and/or care for patients with MERS-CoV influenza if you have opportunity?
   a. Yes
   b. No

For questions 22-26, if a Flu Pandemic began- would you come into work if:

22. I had symptoms consistent with flu e.g., fever, and cough.
   a. Yes
   b. No

23. I had symptoms consistent with flu and there was a severe staff shortage?
   a. Yes
   b. No

24. I was well but I knew that a patient in my hospital had influenza-like illness?
   a. Yes
   b. No

25. I was well but I knew that a colleague had contracted pandemic influenza?
   a. Yes
   b. No

26. A family member had symptoms consistent with flu
   a. Yes
b. No

**Demographic**

- **Hospital Bed size:**
  - a. 50-100
  - b. 100-200
  - c. 200-300
  - d. 300-400
  - e. >400

- **Age:**

- **Gender:**
  - a. Male
  - b. Female

- **Marital Status**
  - a. Single
  - b. Married

- **Professional**
  - a. RT staff.
  - b. RT supervisor.
  - c. Clinical Instructor/Educator.
  - d. RT manager.
  - e. Other __________.
• Living Status
  a. Living with parents.
  b. Living with children.
  c. Living with spouse only.
  d. Living alone.

Thank you for taking the time to complete this survey. If you have any comments you wish to share, please write below:
APPENDIX 2: COVER LETTER

04/15/2015

Dear Participant:

My name is Naif Alruwaili and I am a graduate student at Georgia State University. For my final project, I am assessing Respiratory Therapists’: knowledge, skills, and attitude, in order to examine the association with MERS-CoV disaster in Saudi Arabia. Because you are an RT who already joined the Saudi Society for Respiratory Care (SSRC), I am inviting you to participate in this research study by completing the attached survey. The following questionnaire will require approximately twelve minutes to complete. There is no compensate on for responding nor is there any known risk. In order to ensure that all information will remain confidential, please do not include your name. Copies of the project will be provided to my thesis’s advisor, Dr. Goodfellow and the other committee members. If you choose to participate in this project, please answer all questions as honestly as possible. Participation is strictly voluntary and you may refuse to participate at any time. Completion and return of the questionnaire will indicate your willingness to participate in the survey. The data collected will provide useful information to contribute in supporting the lack of literature knowledge in the health care providers’ reaction toward global pandemic challenges, and supporting the idea of sharing the responsibilities in the global village society during a pandemic event.
Thank you for taking the time to assist me in my educational endeavors.

Sincerely,

*Naif M. Alruwaili*

nalruwaili1@student.gsu.edu

*Dr. Goodfellow*

ltgoodfellow@gsu.edu
APPENDIX 3: IRB Approval

INSTITUTIONAL REVIEW BOARD

Mail:  P.O. Box 3999
      Atlanta, Georgia  30302-3999

Phone:  404/413-3500
Fax:  404/413-3504

In Person:  Dahlberg Hall
            30 Courtland St, Suite 217

May 08, 2015

Principal Investigator: Lynda T Goodfellow

Study Department: GSU - Georgia State University, GSU - Respiratory Therapy

Study Title: Respiratory Therapist Knowledge, Skills, Attitudes & MERS-CoV Disaster

Submission Type: Exempt Protocol Category 2

IRB Number: H15533

Reference Number: 333419

Approval
Date:  05/08/2015

Expiration
Date:  05/07/2018

The above referenced study has been determined by the Institutional Review Board (IRB) to be exempt from federal regulations as defined in 45 CFR 46 and has been evaluated for the following:

1. determination that it falls within one of more of the six exempt categories allowed by the institution; and
2. determination that the research meets the organization’s ethical standards

If there is a change to your study, you should notify the IRB through an Amendment Application before the change is implemented. The IRB will determine whether your research protocol continues to qualify for exemption or if a new submission of an expedited or full board application is required.

Exempt protocols must be renewed at the end of three years if the study is ongoing. When the study is complete, a Study Closure Form must be submitted to the IRB.

Any unanticipated/adverse events or problems resulting from this investigation must be reported immediately to the
University Institutional Review Board. For more information, please visit our website at

www.gsu.edu/irb. Sincerely,

Susan Vogtner
Susan Vogtner, IRB Member

Federal Wide Assurance Number:
00000129
Dear Respiratory Therapist,

My name is Naif M. AlRuwaili and I am a graduate student at Georgia State University. For my final project, I am assessing Respiratory Therapists': knowledge, skills and attitudes in order to examine the association with the recent MERS-CoV disaster in Saudi Arabia. Because you are a Respiratory Therapist are a member of the Saudi Society for Respiratory Care (SSRC), I am inviting you to participate in this research study by completing the survey link below. The following questionnaire will require approximately twelve minutes to complete. There is no compensation for responding nor is there any known risk. In order to ensure that all information will remain confidential, please do not include your name. Copies of the project will be provided to my thesis’s advisor, Dr. Lynda T. Goodfellow and the other committee members. If you choose to participate in this project, please answer all questions as honestly as possible. Participation is strictly voluntary and you may refuse to participate at any time. Completion and return of the questionnaire will imply your willingness to participate in the survey. The data collected will provide useful information by contributing to the literature knowledge in the health care provider's reaction toward global pandemic challenges. This supports the idea of sharing the responsibility in the global village society during a pandemic event.

Note: If you agree to participate in the survey please find the link below and click "YES”, if not you can close this window.
Thank you for taking the time to assist me in my educational endeavors.

https://www.surveygizmo.com/s3/2089891/MERS-CoV-epidemicdisaster

Very sincerely,

Naif M. AlRuwaili - nalruwaili1@student.gsu.edu
Dr. Lynda T. Goodfellow - LTGoodfellow@gsu.edu
Department of Respiratory Therapy
Georgia State University
P.O.box 4019
Atlanta, GA 30302
(404) 413-1225
APPENDIX 5: Informed Consent

Georgia State University
Department of Respiratory Therapy
Informed consent

Title: “Respiratory Therapists’ Knowledge, Skills, Attitudes & MERS-CoV Disaster”
Principal investigator: Dr. Lynda T. Goodfellow
Co-Investigator: Naif AlRuwaili

I. Purpose:

You are invited to participate in a research study. The purpose of the study is to assess Respiratory Therapists’ knowledge, skills and attitudes, in order to examine the association with MERS-CoV disaster in Saudi Arabia. In addition, it aims to investigate the impact of Ministry of Health MOH guidelines on that behavior.

II. Procedure:

If you decide to participate, you will be asked to agree before starting answering the survey questions. If you agree you will click “YES” and continue with the survey. If you decide not to participate you will click “NO” and be done. Your participation in this study is completely voluntary. You can refuse to participate or stop taking the survey at any time without penalty or loss of benefits to which you are otherwise entitled. Most people will be able to complete the survey in less than twelve minutes.

III. Risks:

In this study, you will not have any more risks than you would in a normal day of life.

IV. Benefits:

Participation in this study may not benefit you personally. Overall, we hope to gain information about this research as it may have a good impact on Respiratory therapy profession in Saudi Arabia in the future.

V. Voluntary Participation and Withdrawal:

Participation in research is voluntary. You do not have to be in this study. If you decide to be in the study and change your mind, you have the right to drop out at any time. You may skip questions or stop participating at any time. Whatever you decide, you will not lose any benefits to which you are otherwise entitled.
VI. **Confidentiality:**

We will keep your records private to the extent allowed by law. Dr. Lynda Goodfellow and Khalid Alwadeai will have access to the information you provide. Information may also be shared with those who make sure the study is done correctly (GSU Institutional Review Board, the Office for Human Research Protection (OHRP). We will use a study number rather than your name on study records. The information you provide will be stored in an excel file on a password protected computer, looked inside a cabinet inside the office of the PI. Only the PI has access to the office, cabinet and password. Your name and other facts that might point to you will not appear when we present this study or publish its results. The findings will be summarized and reported in group form. You will not be identified personally.

VII. **Contact Persons:**

Contact Dr. Lynda Goodfellow at LTGoodfellow@gsu.edu or Naif Alruwaili at Nalruwaili1@student.gsu.edu or at (404) 413-1225 if you have questions, concerns, or complaints about this study. You can also call if you think you have been harmed by the study. Call Susan Vogtner in the Georgia State University Office of Research Integrity at 404-413-3513 or svogtner1@gsu.edu if you want to talk to someone who is not part of the study team. You can talk about questions, concerns, offer input, obtain information, or suggestions about the study. You can also call Susan Vogtner if you have questions or concerns about your rights in this study.

VIII. **Copy of Consent Form to Subject:**

We will give you a copy of this consent form to keep.

If you are willing to volunteer for this research, please click on the link to the survey and agree to participate by clicking “YES”.

Consent:

1. Do you agree to voluntarily consent to participate in this study?

   a. Yes.
   b. No.