

ORIGINAL RESEARCH

CORONA EXPERIENCE

Anesthesia staff perceptions about preparedness for the COVID-19 pandemic at King Abdulaziz University Hospital: A cross-sectional study

Wadeeah Bahaziq^{1,2}, Alaa Sabbahi^{1,2}, Auhood Bukhary^{1,2}, Nada Noaman^{1,2},
Daina Sabbahi³, Sarah Farsi^{1,2}, Abdulaziz Boker^{1,2,4*}

Author affiliations:

1. Department of Anesthesia & Critical Care, Faculty of Medicine, King Abdulaziz University, , P.B. Box 80215, Jeddah 21589, Saudi Arabia.
2. King Abdulaziz University Hospital, Jeddah, Saudi Arabia.
3. Department of Dental Public Health, Faculty of Dentistry, King Abdulaziz University, Jeddah, Saudi Arabia.
4. Clinical Skills and Simulation Centre, King Abdulaziz University, Jeddah, Saudi Arabia

Correspondence: Prof. Abdulaziz Boker; Email: bokera@hotmail.com, aboker@kau.edu.sa; Tel: 00966-2-640-1000 (ext. 1-10199/10209); Fax: 00966-2-640-8335

Abstract

Objectives: This study was conducted to assess the perceptions and the opinions of our anesthesia and critical care staff at King Abdulaziz University Hospital regarding the preparation strategy during the COVID-19 pandemic.

Methodology: In this cross-sectional study, an electronic questionnaire was constructed using Google forms and sent to staff. The questionnaire included questions on the demographic information of the participants and the department's strategic plans, preparedness and protective measures taken to protect staff during the COVID-19 outbreak.

Results: A response rate of 71% was achieved. The results revealed that 75% of the participants felt that they were trained well enough to handle a positive or suspected COVID-19 patient. Stress levels increased during the initial COVID-19 outbreak then decreased after the department began providing COVID-19 educational activities (such as PPE courses and virtual Monday grand rounds) ($p < 0.001$). There was a significant correlation between stress levels before and after the introduction of continuous medical education courses ($SP = 0.68$, $p < 0.001$).

Conclusion: In crisis management plans, psychological pressure management includes the effective use of continuous medical education, periodic group meetings, and mental health wellbeing clinics. For confidence development among healthcare workers, clinical simulation drills can be a key management strategy.

Key words: COVID-19; Pandemic; Stress; Crisis; Continuous Medical Education; Simulation; Staff wellbeing

Citation: Bahaziq W, Sabbahi A, Bukhary A, Noaman N, Sabbahi D, Farsi S, Boker A. Anesthesia staff perceptions about preparedness for the COVID-19 pandemic at King Abdulaziz University Hospital: A cross-sectional study. *Anaesth. pain intensive care* 2021;25(6):777–787; DOI: [10.35975/apic.v25i6.1702](https://doi.org/10.35975/apic.v25i6.1702)

Received: January 6, 2021, **Reviewed:** August 9, 2021, **Accepted:** August 9, 2021

1. Introduction

The first case of COVID-19 infection was identified in Wuhan, China, in December 2019. Soon after, the disease spread rapidly to other countries. The World Health

Organization (WHO) declared it a public health emergency of international concern on January 30, 2020.¹ In Saudi Arabia, the first case was confirmed on March 2, 2020.²

One of the main challenges facing health services during the pandemic is the adoption of new practices and modification of existing protocols to meet specific operational needs. Clinical guideline development and implementation usually takes months to years. However, the rapid viral spread of COVID-19 did not allow sufficient time for lengthy preparations. Within two months of the outbreak in China, there were over 74,000 confirmed COVID-19 cases worldwide. Governments were instituting regulations to limit the spread. This was an attempt to 'buy time' for scientists to better understand the virus and how to control it.³ Berwick raised the concern that the US healthcare system was not prepared for 21st century threats. He emphasized the importance of a national system and a regional standard for excellence in preparedness. He also highlighted two technical barriers: data sharing and supply chain management.⁴

The Saudi government implemented restrictive measures to limit the local spread of infection. On March 24, 2020, a nationwide curfew was imposed. The Ministry of Health (MOH) ensured that the public had access to updated recommendations about 'how to stay safe'. It also emphasized that limiting the spread is everyone's responsibility.⁵ Hospitals began to develop plans to prepare healthcare workers (HCWs) and institutions to face the pandemic. Due to the lack of high-quality trials, most of the health system actions were largely based upon published experience with the disease, worldwide guidelines, and local experience from previous similar outbreaks.⁶

HCWs carry a high risk of contracting the disease. In Italy, one month from the start of the outbreak, a total of 1028 out of 5200 intensive care unit beds were occupied by SARS-CoV-2 infected patients.⁷ Furthermore, 20% of the HCWs became infected.⁸ To maintain a high standard of healthcare, protecting the workforce is essential. However, limited personal protective equipment supply was not the only obstacle. HCWs required psychological support, family support, and much needed rest after strenuous work for prolonged duty hours.⁹

Internationally, many studies have examined similar challenges. Osuchowski et al. identified the need for rapid capacity building to help HCWs deal with rapidly evolving clinical information. They highlighted the importance of identifying existing gaps to overcome the COVID-19 crisis.¹⁰ Similarly, Parajuli et al. identified a significant attitude effect of HCWs secondary to the COVID-19 information gap in Nepal.¹¹ At the national level, a countrywide survey in Saudi Arabia showed similar knowledge and attitudes across all regions. The authors stated that more educational programs are needed to overcome the knowledge gap among HCWs.¹²

Three questions regarding Anesthesia staff at King Abdulaziz University Hospital (KAUH), specifically those facing COVID-19 as first line workers, were raised at that time. First, what are the immediate needs for continuous medical education training and education courses on COVID-19? Second, what are their perceptions of the strategies followed in the department to face the COVID-19 outbreak? Finally, do the training courses and/or other measures taken by the department help alleviate stress?

The present study aimed to evaluate the anesthesia staff's perceptions of their department's strategy in facing the COVID-19 pandemic, their stress levels, and identify factors affecting staff well-being during the planning and preparing stages of the COVID-19 pandemic. We hypothesized that the anesthesia staff felt that they were well trained to handle a COVID-19 patient and that the training and educational courses helped alleviate stress.

2. Methodology

An immediate plan to face the sudden COVID-19 outbreak was developed by the Anesthesia and Critical Care Department at King Abdulaziz University Hospital (KAUH). The aim was to ensure that they were able to provide the best clinical patient care while at the same time preventing the staff from becoming exhausted and emotionally depleted. The preparedness plan covered the following five strategies: personal protective equipment (PPE), COVID-19 crisis committee, continuous medical education, simulation, and staff well-being.

2.1. Background

2.1.1. Personal Protective Equipment (PPE):

COVID-19 PPE simulation-based training at the King Abdulaziz University Clinical Skills & Simulation Centre started on March 15, 2020. The Anesthesia and Critical Care Department enrolled all anesthesiologists, anesthesia technicians, and nurses in the course. In addition, high filtration respirator mask (N95) fit testing sessions were arranged for the department staff with the Infectious Control Unit on March 24, 2020. Powered air purifying accelerators (PAPRs) were not available for training or clinical use in the facility during the first three months.

2.1.2. Covid-19 Crisis Committee:

On March 19, 2020, the Anesthesia & Critical Care Department established a COVID-19 Crisis Committee, and a hospital-wide COVID-19 Committee was established five days later. The taskforce of the department COVID-19 crisis committee included members of the Anesthesia & Critical Care Department. Its main focus was on establishing a COVID-19 pre-surge plan and surge plan. As guidelines and

recommendations regarding COVID-19 were rapidly evolving, the team met twice to revise the department's plan.

In an effort to protect staff and limit chances of transmitting the virus, on March 24, 2020, the hospital suspended all elective surgeries. The anesthesia staff members were split into two teams. Each team worked on alternate weeks. On April 9, 2020, the COVID-19 KAUH crisis committee established an airway team across the hospital. The airway team was staffed, managed, and operated by the anesthesia team. The aim of the airway team facilitated and managed intubations for all suspected and confirmed COVID-19 cases. The airway team included an anesthesia physician and a technician, and they covered an 8-hour shift. The airway team operated 24 hours a day, 7 days a week.

2.1.3. Continuous Medical Education:

With the rapid evolution of worldwide COVID-19 guidelines and management protocols, it is important that all members of the department be updated. All teaching activities, except for the PPE course, were provided online. The grand rounds of the Anesthesia & Critical Care department continued to run once per week via the online meeting platform Zoom®. All hospital memos or protocols were distributed via email. A departmental "WhatsApp®" group was used to share COVID-19 related publications, assist with emotional support, and provide positive reinforcement for the staff.

2.1.4. Simulation:

With the cooperation of the Anesthesia and Critical Care Department and the Clinical Skills & Simulation Centre, HCWs conducted a total of six simulation drills between March 16, 2020 and April 23, 2020. The aim of the simulation drills was to plan, achieve, and identify the challenges with the newly implemented hospital and departmental clinical pathways and policies for the management of COVID-19.

A total of six simulation cases were conducted for the following sites: the pre-operation negative pressure room, labour and delivery unit, operating room, intensive care unit, pediatric operating room, and recovery room. Two observers watched the participants' performance and completed a checklist. After termination of the scenario, a debriefing discussion took place between the observers and participants. All comments, debriefing notes, and discussions were reported to the anesthesia department and the department's COVID-19 crisis committee.

2.1.5. Staff Wellbeing:

A "WhatsApp®" group that included all members of the department was utilized for wellbeing support, motivation and positive reinforcement. The Anesthesia and Critical Care department encouraged consultants to

motivate the staff through small group debriefings after managing COVID-19 patients, including airway team cases and operating room cases. The department sent a memo to all staff with information on how to access mental health clinics and provided a 24-hour hotline for staff support.

2.2. Study Design

This cross-sectional study was conducted at the KAUH in Jeddah, Saudi Arabia. Ethical approval was obtained from the Research Ethics Committee of the King Abdulaziz University Faculty of Medicine and KAUH. The questionnaire was conducted via a web-based platform (Google forms) (Supplementary 1). The participants' consent was integrated at the beginning of the electronic questionnaire. Data collection was carried out between April 26, 2020 and May 6, 2020.

The inclusion criteria were as follows: participants should be anesthesia staff, including physicians, at all different work experience levels (consultants, senior registrar, registrar, clinical fellows, and residents) and anesthesia technicians. Critical care staff were excluded.

The questionnaire was divided into three parts. The first part included demographic data and participants' work experiences. The second part inquired about protective and supportive measures taken by staff related to COVID-19. These included attending the departmental educational rounds, attending the PPE course, undergoing a mask fit test, and using alternative methods of protection from the virus. The third part evaluated the staff's stress level and fear of contracting the infection. The staff were asked to recall their stress levels at three different points in time: before the pandemic, during the pandemic but before the institution of the weekly educational departmental rounds, and finally after the start of the weekly educational departmental rounds. These variables were measured using a Likert scale ranging from 1–10 (1 being the lowest and 10 being the highest). We also included questions about staff's fear of being infected or passing the infection to their families. A link to the questionnaire was distributed using the instant messaging software WhatsApp (WhatsApp Inc., Mountain View, California, USA). Participation in the questionnaire was voluntary.

Statistical Analysis: Data were entered and analyzed using SPSS software for Windows (Version 20, SPSS Inc., IBM, and Somers, New York, USA). Frequency-descriptive statistics were also obtained. The results of some variables were summarized as median and interquartile range (IQR), or percentage and numbers. The test of significance was performed at 0.05. The Friedman test was used to assess the statistically significant differences between stress levels at different time points.

3. Results

3.1. Demographic Characteristics:

The questionnaire was sent to all the anesthesia department staff (95 staff members) who fulfilled the inclusion criteria. Investigators were excluded from this study. Responses were received from 68 participants, with a response rate of 71%. The age of the participants ranged from 25–65 y; one participant was younger than 25 y old, whereas the others (74%) were mostly aged between 26–45 y. Approximately 80% of the participants were men. A total of 25% of the participants were consultants and the rest were registrars (20.6%), residents (20.6%), senior registrars (14.7%), or anesthesia technicians (19.1%). Of the participants, 36.8% had 11–20 y of experience in anesthesia, with only 3% of them having more than 30 y of experience (Table 1).

3.2. Participants in the Department's Strategic Plans / Protection of Staff against COVID-19:

Approximately 66% of the participants underwent N95 mask fitting, and 88.8 % had a successful fitting test. Among the 11.1% (5 participants) who did not have a successful fitting test, only two of them had an alternative (one used a helmet and the other participant reported another method of protection); the other three participants reported a lack of an alternative method of protection (Table 1). Almost all participants had attended the PPE course before completing this survey, and about 65% of the participants were part of the airway team. The majority (77.9%) of the participants found the virtual Monday ground round meetings sufficient to keep them updated with COVID-19 and the hospital's policies.

More than half of the participants (54.4%) were not satisfied with the measures taken by the hospital to ensure their safety. The majority of the staff (97.1%) were

satisfied with dividing the teams into A and B. A total of 60% of the participants felt that the workload decreased after dividing the teams into A and B, while 25% reported no changes in workload. Of the participants, 85% thought that continued departmental education (such as PPE courses and virtual Monday grand rounds) would help reduce the risk of contracting the infection from patients. Only 25% reported that they did not feel that they had sufficient training to handle a positive or suspected COVID-19 patient (Table 2).

3.3. The Wellbeing of Participants during the Pandemic:

About half of the participants (51.5%) had been in contact with a positive or suspected COVID-19 patient. When participants were asked about their fear of acquiring the infection, 82.4% reported a fear of contracting COVID-19, and 95.6% were afraid that they may infect their family. About 56% thought that stress did not affect their concentration, relationships with colleagues, and/or work performance. When asked about the 8-hr airway team shifts, 60% of the participants were part of the airway team, 82.9% of the team felt that the 8-hr team was not overwhelming, while only seven participants (17.1% of the team) reported that the shifts were too overwhelming. Among all participants, 82.4% reported that they got enough rest. Regarding the mental health clinic during the COVID-19 pandemic, 66% of the participants did not know if they had access to this clinic, while 27.9% reported that they did not have access (Table 3).

3.4. Stress Level of Participants at Different Time Points:

The participants' responses regarding their stress levels before the COVID-19 pandemic and after the COVID-19

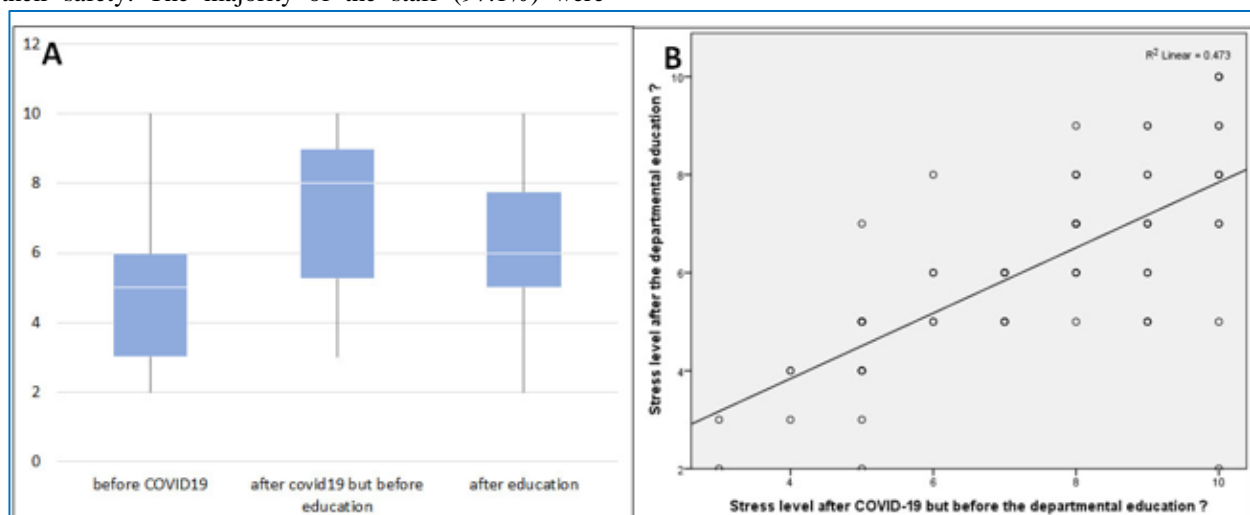


Figure 1: A: Stress level of participants at different time points. B: A Spearman's rank-order correlation between stress level before and after introducing continuous medical education courses

pandemic, before and after the departmental continuous medical education activities (such as PPE courses and virtual Monday grand round), were ranked on a 10-point Likert scale. The Friedman test was used to assess the statistically significant differences between stress levels at different time points ($P < 0.001$). We can see that the basal median and IQR of stress level [5 (3–6)] increased after COVID-19 [8 (5.25–9)] and then decreased after the department began providing COVID-19 educational activities [6 (5–7.75); Table 4 and Figure 1A].

Spearman's rank-order correlation was used to determine the relationship between stress levels before and after the introduction of the continuous medical education courses. There was a strong, positive correlation, which was statistically significant ($p = 0.684, p < 0.001$) (Figure 1B).

Table 5 shows that there was no statistical significance between feeling well trained to handle a positive or suspected COVID-19 patient and other variables such as sex, position, performing the N95 mask fitting test, and attending the PPE course.

As for the open-ended questions in the survey, responses to those questions for all participants ($n = 68$) were analyzed and categorized as shown in Table 6. It should be noted that some participants had more than one response when answering the questions. The four open-ended questions

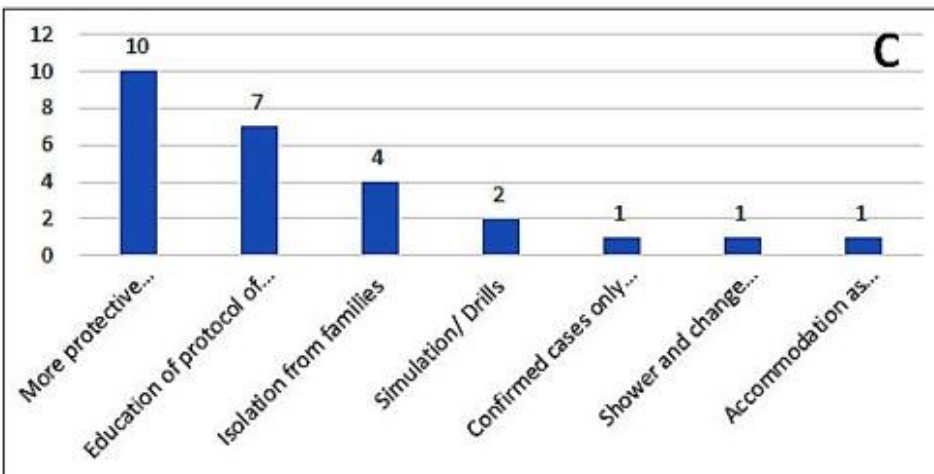
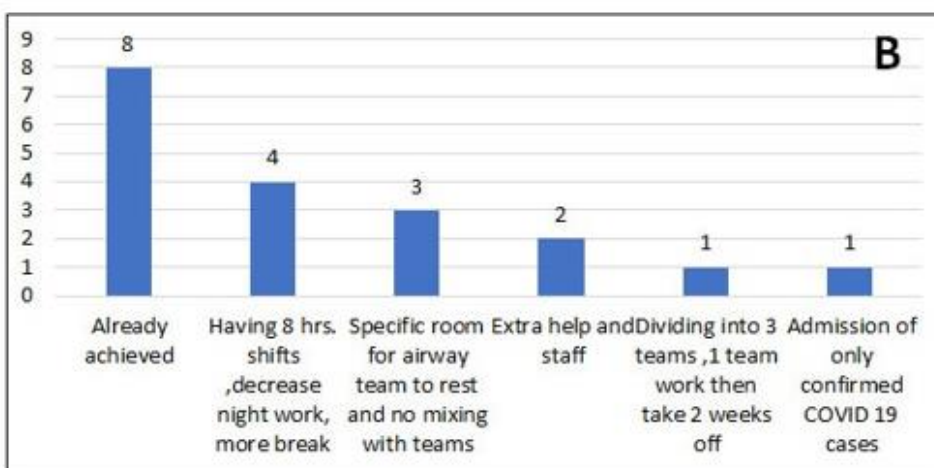
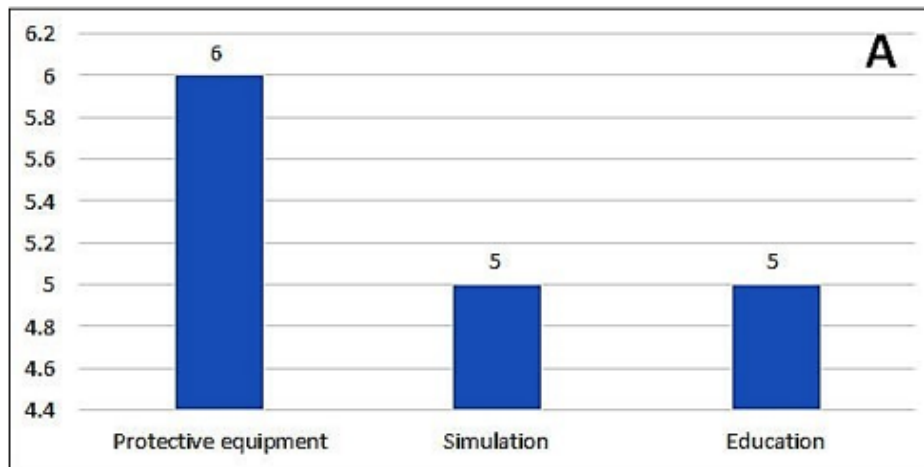
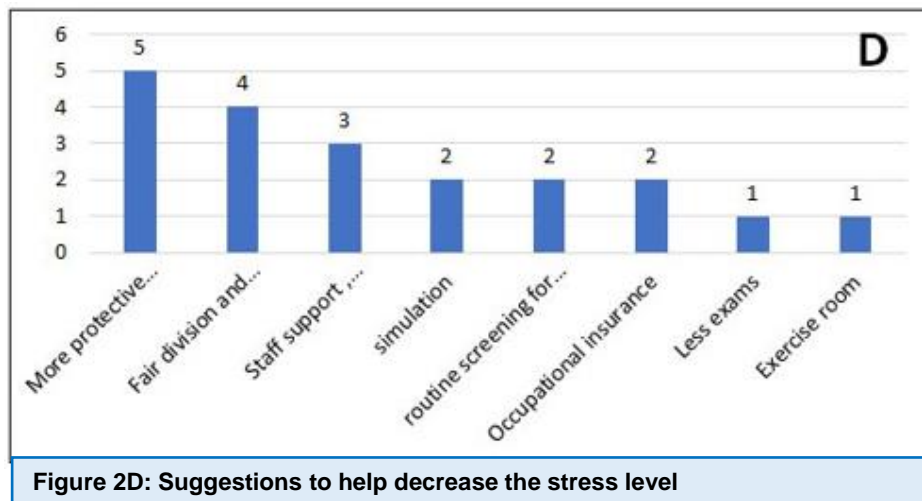


Figure 2: A: Suggestions for improvement the quality of the department's continuous education. B: Measures to help decreasing the workload. C: Ways in which we can prevent the infection from spreading to our families

were focused on participants' suggestions regarding improving the quality of the departmental continuous medical education and how to decrease workloads and stress levels. We also invited suggestions for alternative



ways by which the hospital can prevent the spread of the infection to the staff's families. Suggestions regarding improvement in the quality of the departmental continuous medical education were concentrated more on protective equipment (increase the amount of N95s, add face shields, include more fitting tests, no reusing PPE, and employing full PPE), simulations (increase courses, drills, and use inside ORs), and education (broad scope outside anesthesia, clear safety instructions, workshops, and questions after courses) (Figure 2A). Suggestions to help decrease the workload included having an 8-hour shift, decreasing night work, increasing rest periods, having a separate room for airway team to rest and not be mixed in with other teams, more staff and help from colleagues, divide the taskforce into three teams with one team working then taking two weeks off, and admission of only confirmed COVID-19 cases (Figure 2B). Ways in which we can prevent the infection from spreading to our families concentrated on more protective equipment, education on the protocol of COVID-19 cases, hygiene, social distance, and isolation from families (Figure 2C). Suggestions to help decrease the stress level concentrated on more protective equipment, fair division and collaboration between colleagues, staff support, reassurance, and education (Figure 2D).

4. Discussion

Due to the active role of the anesthesia team in managing COVID-19 patients, they are at high risk of acquiring the virus. One of the initial reports from Wuhan, China, found that approximately 30% of the people who

developed COVID-19 were healthcare workers.¹³ In Italy, 9% of COVID-19 infections occurred among healthcare workers.¹⁴ From the data collected in this study, it was discovered that 82.4% of staff were afraid of being infected, and the majority were concerned about infecting their families. Healthcare systems around the world are struggling as healthcare workers refuse to work with COVID-19 patients due to the concern of endangering their families.

Many healthcare workers are torn between performing their clinical duties and protecting their families.¹⁴ In our survey, 85% of participants thought that the department's

Table 1: Demographic characteristics of the sample (n = 68)

Variables		N (%)
Gender	Male	55 (80.9)
	Female	13 (19.1)
Age	< 25	1 (1.5)
	26-35	26 (38.2)
	36-45	24 (35.3)
	46-55	15 (22.1)
	56-65	2 (2.9)
Position	Anesthesia Technician	13 (19.1)
	Consultant	17 (25.0)
	Registrar	14 (20.6)
	Resident	14 (20.6)
	Senior Registrar	10 (14.7)
Practice (y)	0 – 5 y	14 (20.6)
	6 – 10 y	15 (22.1)
	11 – 20 y	25 (36.8)
	21 – 30 y	12 (17.6)
	> 30 y	2 (2.9)
Doing N95 mask fitting test?	No	23 (33.8)
	Yes	45 (66.2)
If yes, Is it successful?	Yes	40 (88.8)
	No	5 (11.1)
If no, an alternative provided by hospital?	Yes	2 (40)
	No	3 (60)

continuous medical education (PPE courses and virtual grand rounds) would help to reduce the risk of infection and transmission of the disease to their families. All participants, except one, attended the PPE course before completing this survey. We used the virtual grand rounds Zoom® calls and the WhatsApp® messaging support group to emphasize COVID-19 infection control and prevention using updated guidelines of the WHO and Saudi Arabia's MOH webpage.^{5, 15} By April 2020, K. Prescott et al. examined HCW preparedness in England. They confirmed that HCWs must be provided with key guidance to reduce their anxiety and optimize their performance.¹⁶

Attention to HCWs' psychological well-being is a priority for maintaining a safe working environment. During the time of a pandemic, disaster planners and managers should communicate the risks clearly to HCWs and provide them with as much support and protection as possible.¹⁷ Situations like this pandemic might generate fear of the unknown among HCWs. It is essential that risk communication techniques be performed by appropriate institute leaders and managers by stating the actual risk, risk level, and management plans that have been implemented to minimize or manage the risk.¹⁸ In China, the Psychological Clinical Research Centers responded rapidly to psychological pressure on staff. HCWs stated that they needed more rest and that they were concerned about the shortage of PPE supplies and transmitting the infection to their families. Health institutes were advised to provide their workers with rest, food, and daily supplies. Many HCWs are worried about global PPE shortages. Hospitals have been advised to develop detailed rules on using and managing PPE to reduce HCWs' concerns.¹⁹ During the pandemic, healthcare institutes need to remind HCWs of the availability of

psychological support. Of the participants in this study, 66% did not know if they had access to a mental health clinic. The Anesthesia and Critical Care Department sent a memo to all the staff with information on how to access

Table 2: Participation and satisfaction of participants about department's strategic plans and protective measures taken to protect staff against COVID-19:

Variable		N (%)
PPE course attendance	No	1 (1.5)
	Yes	67 (98.5)
Have you ever been part of the airway team?	No	24 (35.3)
	Yes	44 (64.7)
The virtual Monday ground round meetings are sufficient in keeping you updated with COVID-19?	No	15 (22.1)
	Yes	53 (77.9)
Satisfied with measures taken by hospital to ensure your safety?	No	37 (54.4)
	Yes	31 (45.6)
Satisfied with dividing the teams into A and B?	No	2 (2.9)
	Yes	66 (97.1)
After dividing the teams into A and B, do you feel that your workload has increased?	No change	25 (36.8)
	No (decreased)	41 (60.3)
	Yes (increased)	2 (2.9)
Departmental education helped to reduce the risk of getting infection from patients?	No	10 (14.7)
	Yes	58 (85.3)
Feeling trained well enough to handle a positive or suspected COVID-19 patient?	No	17 (25.0)
	Yes	51 (75.0)

Table 3: Wellbeing of the participants during the pandemic

Variable	Reply	N (%)
Contact with a positive or suspected COVID-19 patient?	No	33 (48.5)
	Yes	35 (51.5)
Are you afraid of infection?	No	12 (17.6)
	Yes	56 (82.4)
Are you afraid that you may infect your family members after working at the hospital?	No	3 (4.4)
	Yes	65 (95.6)
Is stress affecting your concentration/ relationship with colleagues and/or work performance?	No	38 (55.9)
	Yes	30 (44.1)
Are the 8hr airway team shifts too overwhelming for you?	Not part of the airway team	27 (39.7)
	No	34 (50.0)
	Yes	7 (10.3)
Do you get enough rest?	No	12 (17.6)
	Yes	56 (82.4)
Are you provided access, by the hospital, to the mental health clinic during the COVID-19 pandemic?	I don't know	45 (66.2)
	No	19 (27.9)
	Yes	4 (5.9)

Table 4: stress level of participants at different time points on 10 points Likert scale:

Stress level	Median(Q1-Q3)	Range
Before the COVID-19 pandemic?	5 (3-6)	2-10
After the COVID-19 pandemic but before the continuous departmental medical education (such as PPE courses and virtual Monday grand round)?	8 (5.25-9)	3-10
After the department began providing COVID-19 educational activities (such as PPE courses and virtual Monday grand round)?	6 (5-7.75)	2-10

P1, P2, P3, P4 < 0.001
Note: All variables are summarized as median and IQR. The test of significance was carried out at 0.05 levels Friedman test was used to assess the statistical significant difference between stress level in different time points where; P1 overall significance difference; P2 before COVID 19 versus after COVID 19; P3 before COVID 19 versus after educational activities, and P4 after COVID 19 versus after educational activities

Table 5: Relation between staff's feeling to whether they are trained well or not in handling COVID-19 patients and other variables

Variables		Do you find yourself <u>well-trained</u> to handle a COVID-19 patient?		p-value
		No	Yes	
Gender	Female	4 (30.8)	9 (69.2)	0.723**
	Male	13 (23.6)	42 (76.4)	
Position	Anaesthesia Technician	3 (23.1)	10 (76.9)	0.101**
	Consultant	3 (17.6)	14 (82.4)	
	Registrar	1 (7.1)	13 (92.9)	
	Resident	7 (50.0)	7 (50.0)	
	Senior Registrar	3 (30.0)	7 (70.0)	
Doing the N95 mask fitting test?	No	9 (39.1)	14 (60.9)	0.054*
	Yes	8 (17.8)	37 (82.2)	
Attending the PPE course?	No	0 (0.0)	1 (100.0)	0.71**
	Yes	17 (25.4)	50 (74.6)	
Are the 8hr airway team shifts too overwhelming for you?	Not part of the airway team	10 (37.0)	17 (63.0)	0.092*
	No	7 (20.6)	27 (79.4)	
	Yes	0 (0.0)	7 (100.0)	
Contact with a positive or suspected COVID-19 patient?	No	9 (27.3)	24 (72.7)	0.674*
	Yes	8 (22.9)	27 (77.1)	

Note. All variables are summarized as number and percentage

*p-value using Chi-square

** p value using fisher exact test

The test of significance was carried out at 0.05 levels

the mental health clinics and provided a 24-hour hotline for staff support.

When Saudi Arabia announced the first case of COVID-19, the department arranged for staff to conduct an N95 mask fit test. It was found that 66.2% of the participants were able to complete it. The Anesthesia residents and

Anesthesia technicians were among the participants who were unable to conduct the N95 mask fit test. At the beginning of the pandemic, the hospital informed the heads of the departments about the low supply of PPE. HCWs who were first liners in the management of COVID-19 cases were a priority to be tested. As airway

Table 6: Suggestions to help improve the quality of the department's continuous education?	
Open ended questions	n
Suggestions to help improve the quality of the department's continuous education	
Protective equipment(increase N95, face shield , more fitting test, no reuse, full PPE)	6
Simulations(increase courses, drills, use inside OR)	5
Education(broad scope outside anaesthesia, clear safety instructions, workshops , questions after courses)	5
Nothing/ No response	52
Suggestions to help decrease the workload?	
Already achieved	8
Having 8 h shifts ,decrease night work, more break	4
Specific room for airway team to rest and no mixing with teams	3
More staff and help from colleagues	2
Dividing into 3 teams ,1 team work then take 2 weeks off	1
Admission of only confirmed COVID 19 cases	1
No response	47
Ways in which we can prevent the infection from spreading to our families	
More protective equipment	10
Education of protocol of COVID 19 cases , hygiene and social distance)	7
Isolation from families	4
Simulation/ Drills	2
Confirmed cases only handled by expert physicians	1
Shower and change uniform at the end of the shift	1
Accommodation as front line	1
No response	45
Suggestion to help decrease the stress level	
More protective equipment	5
Fair division and collaboration between colleagues	4
Staff support , reassurance , education	3
Simulation	2
Routine screening for COVID19	2
Occupational insurance	2
Less exams	1
Exercise room	1
No response	51
<i>Note. Some participants gave more than one answer</i>	

guidelines and recommendations emphasize that the most experienced/ skilled airway clinician manages the airway, the department requested that the senior staff get mask fit tested first.²⁰ For 11.1% of staff who did not have a successful mask-fitting test, the Anesthesia & Critical Care Department informed the hospital director the urgency of providing an alternative to the N95 mask, such as a PAPR. As per the open-ended questions in the

survey, the answers suggested more PPE supply concerns and the importance of providing staff with designated rest areas in order to improve staff well-being.

The participants' stress levels during the COVID-19 pandemic showed a median and IQR score of 6 (5 –7.75). With this pandemic, there was a rapid change in the guidelines pertaining to COVID-19. Healthcare systems must attempt to remain up-to-date with new clinical

information, guidelines, and management strategies. Continuing medical education is crucial to discuss the latest publications. Even at the start of the pandemic, the Department of Anesthesia and Critical Care continued their morning weekly grand rounds through Zoom®. The majority of the participants (about 79%) were satisfied with efficacy of the virtual ground rounds in keeping them updated with the latest publications and hospital policies related to the COVID-19 outbreak. Similar findings were reported by Tarchichi and Szymusiak.²¹ They showed that continuous medical education at a time of social distancing as well as high-quality podcasts were crucial during a global pandemic.²¹ Participants suggested increasing the number of clinical simulation drills.

The Anesthesia and Critical Care Department conducted a total of six simulation clinical drills early at the start of the pandemic to discover challenges with the department's preparedness. In response to a question on how to improve our educational programs, participants indicated that they would like to see more simulation drills that are performed under pressure and with the use of full PPE. Of the participants, 51.5% had dealt with a positive or suspected COVID-19 patient, and 25% reported that they did not feel that they were trained well enough to handle COVID-19 patients. Simulation-based medical education facilitates the transfer of knowledge, skills, and attitudes to healthcare providers in a psychologically safe manner.²²

In response to departmental preparedness plans, the majority of participants (97.1%) were satisfied with dividing the teams, and they felt that the workload had decreased. This could be explained by the decrease in the number of operating rooms to make room for critical care beds for the oncoming COVID-19 cases. Since the establishment of the airway team on April 9, 2020, 60% of the participants were part of the airway team, and only seven participants (17.1% of the team) reported that the airway shifts were too overwhelming for them. This could be due to the overwhelming nature of the duties required, which included managing a large number of highly infectious and unstable patients. This topic was beyond the scope of our study and should be further investigated in future research.

There was no statistically significant difference between feeling well trained to handle a positive or suspected COVID-19 patient and other variables such as sex, position, performing the N95 mask fitting test, and attending the PPE course.

Upon in-depth analysis of the participants' opinions, 82.4% reported that they got enough rest. Staff well-being is crucial in such times. The WHO in 2020 emphasized HCWs' mental health and psychosocial considerations during the COVID-19 outbreak. The

WHO gave mental health advice to team leaders and health facility managers.²³ The Anesthesia and Critical Care Department had a WhatsApp® social department group for well-being support, motivation, and positive reinforcement. Anesthesia consultants were encouraged to motivate anesthesia staff through small debriefing groups after management of COVID-19 cases and to report signs of staff burnout to the head of the department.

5. Limitations

The limitations of this study were the small sample size, relatively low response rate, possible recall bias, and optional open-ended questions. A baseline data collection would be useful to compare results and variables at times of crisis and pandemics. We suggest an ongoing dynamic mechanism of data collection and monitoring as key indicators for early identification of issues. Such preparedness for disasters could help in gathering important information during and immediately after disaster occurrences.

6. Conclusion

The challenges with this novel virus are the rapidly evolving international recommendations and guidelines. Staff perception of strategic plans could help guide healthcare institute and clinical department preparedness, as well as detect obstacles during the time of implementation. Thus, continuous analysis of healthcare workers' perceptions at different levels of the pandemic can be one of the keys in planning. In crisis management plans, HCW psychological pressure management includes effective continuous medical education, periodic group meetings, and mental health well-being services or clinics. For confidence development among healthcare workers, clinical simulation drills could be a key management tactic. Post-disaster HCWs' needs can be anticipated and considered during future crisis strategic plan development phases.

7. Conflict of interest

None declared by the authors

8. Authors' contribution

WB, AS, AB, NN, SF: Concept and design of the study, Data collection and analysis, Manuscript writing and approval

AB: Concept and design of the study, Data collection and analysis, Interpretation of results, Manuscript writing, and approval

DS: Design of the study, Data collection, Data analysis and analysis, Manuscript review.

9. References

1. WHO. Novel Coronavirus(2019-nCoV) Situation Report – 11. 2020. Available from: https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200131-sitrep-11-ncov.pdf?sfvrsn=de7c0f7_4
2. Weqaya. Covid-19 Disease Interactive Dashboard. 2020 [cited 2020 June 19, 2020]. Available from: <https://covid19.cdc.gov.sa/daily-updates/>
3. Wu Z, McGoogan JM. Characteristics of and important lessons from the coronavirus disease 2019 (covid-19) outbreak in China: Summary of a report of 72 314 cases from the Chinese Center for Disease Control and Prevention. *JAMA*. 2020 Apr 7;323(13):1239-1242. [PubMed] DOI: [10.1001/jama.2020.2648](https://doi.org/10.1001/jama.2020.2648)
4. Berwick DM, Shine K. Enhancing private sector health system preparedness for 21st-century health threats: foundational principles from a national academies initiative. *JAMA*. 2020 Mar 24;323(12):1133-1134. [PubMed] DOI: [10.1001/jama.2020.1310](https://doi.org/10.1001/jama.2020.1310)
5. MOH. MOH, Various Topics. 2020. Available from: <https://www.moh.gov.sa/en/awarenessplatform/VariousTopics/Pages/default.aspx>
6. Xu Y, Sheng H, Tang Z, Lu J, Ni X. Inflammation and increased IDO in hippocampus contribute to depression-like behavior induced by estrogen deficiency. *Behav Brain Res*. 2015 Jul 15;288:71-8. [PubMed] DOI: [10.1016/j.bbr.2015.04.017](https://doi.org/10.1016/j.bbr.2015.04.017)
7. Spina S, Marrazzo F, Migliari M, Stucchi R, Sforza A, Fumagalli R. The response of Milan's Emergency Medical System to the COVID-19 outbreak in Italy. *Lancet*. 2020 Mar 14;395(10227):e49-e50. [PubMed] DOI: [10.1016/S0140-6736\(20\)30493-1](https://doi.org/10.1016/S0140-6736(20)30493-1)
8. Remuzzi A, Remuzzi G. COVID-19 and Italy: what next? *Lancet*. 2020 Apr 11;395(10231):1225-1228. [PubMed] DOI: [10.1016/S0140-6736\(20\)30627-9](https://doi.org/10.1016/S0140-6736(20)30627-9)
9. The Lancet. COVID-19: protecting health-care workers. *Lancet*. 2020 Mar 21;395(10228):922. [PubMed] DOI: [10.1016/S0140-6736\(20\)30644-9](https://doi.org/10.1016/S0140-6736(20)30644-9)
10. Osuchowski MF, Aletti F, Cavallion JM, Flohé SB, Giamarellos-Bourboulis EJ, Huber-Lang M, et al. SARS-CoV-2/COVID-19: Evolving reality, global response, knowledge gaps, and opportunities. *Shock*. 2020 Oct;54(4):416-437. [PubMed] DOI: [10.1097/SHK.0000000000001565](https://doi.org/10.1097/SHK.0000000000001565)
11. Parajuli J, Mishra P, Sharma S, Bohora KB, Rathour PS, Joshi J, et al. Knowledge and attitude about covid 19 among healthcare workers working in Seti Provincial Hospital. *J Nepal Health Res Counc*. 2020 Nov 14;18(3):466-471. [PubMed] DOI: [10.33314/jnhrc.v18i3.2816](https://doi.org/10.33314/jnhrc.v18i3.2816)
12. Alduraywish AA, Srivastava KC, Shrivastava D, Sghaireen MG, Alsharari AF, Al-Johani K, et al. A countrywide survey in Saudi Arabia regarding the knowledge and attitude of healthcare professionals about coronavirus disease (COVID-19). *Int J Environ Res Public Health*. 2020 Oct 12;17(20):7415. [PubMed] DOI: [10.3390/ijerph17207415](https://doi.org/10.3390/ijerph17207415)
13. Wang D, Hu B, Hu C, Zhu F, Liu X, Zhang J, et al. Clinical characteristics of 138 hospitalized patients with 2019 novel coronavirus-infected pneumonia in Wuhan, China. *JAMA*. 2020 Mar 17;323(11):1061-1069. [PubMed] DOI: [10.1001/jama.2020.1585](https://doi.org/10.1001/jama.2020.1585)
14. Boccia S, Ricciardi W, Ioannidis JPA. What other countries can learn from Italy during the covid-19 pandemic. *JAMA Intern Med*. 2020 Jul 1;180(7):927-928. [PubMed] DOI: [10.1001/jamainternmed.2020.1447](https://doi.org/10.1001/jamainternmed.2020.1447)
15. Coronavirus disease (COVID-19) Weekly Epidemiological Update and Weekly Operational Update. [Internet] Available at <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports>
16. Prescott K, Baxter E, Lynch C, Jassal S, Bashir A, Gray J. COVID-19: how prepared are front-line healthcare workers in England? *J Hosp Infect*. 2020;105(2):142-5. [PubMed] DOI: [10.1016/j.jhin.2020.04.031](https://doi.org/10.1016/j.jhin.2020.04.031)
17. Iserson KV. Healthcare ethics during a pandemic. *West J Emerg Med*. 2020;21(3):477-83. [PubMed] DOI: [10.5811/westjem.2020.4.47549](https://doi.org/10.5811/westjem.2020.4.47549)
18. HEALTHCARE LEADERSHIP COUNCIL. A Thoughtful Approach to Healthcare's Most Difficult Decisions. Available at ; <https://www.hlc.org/post/a-thoughtful-approach-to-healthcares-most-difficult-decisions/> (Accessed on November 19, 2021)
19. Chen Q, Liang M, Li Y, Guo J, Fei D, Wang L, et al. Mental healthcare for medical staff in China during the COVID-19 outbreak. *Lancet Psychiatry*. 2020;7(4):e15-e6. [PubMed] DOI: [10.1016/S2215-0366\(20\)30078-X](https://doi.org/10.1016/S2215-0366(20)30078-X)
20. Brewster DJ, Chrimes NC, Do TB, Fraser K, Groombridge CJ, Higgs A, et al. Consensus statement: Safe Airway Society principles of airway management and tracheal intubation specific to the COVID-19 adult patient group. *Med J Aust*. 2020 Jun;212(10):472-481. [PubMed] DOI: [10.5694/mja2.50598](https://doi.org/10.5694/mja2.50598)
21. Tarchichi TR, Szymusiak J. Continuing medical education in the time of social distancing: the case for expanding podcast usage for continuing education. *J Contin Educ Health Prof*. 2021 Jan 1;41(1):70-74. [PubMed] DOI: [10.1097/CEH.0000000000000324](https://doi.org/10.1097/CEH.0000000000000324)
22. Aggarwal R, Mytton OT, Derbrew M, Hananel D, Heydenburg M, Issenberg B, et al. Training and simulation for patient safety. *Qual Saf Healthcare*. 2010 Aug;19 Suppl 2:i34-43. [PubMed] DOI: [10.1136/qshc.2009.038562](https://doi.org/10.1136/qshc.2009.038562)
23. World Health Organization. Mental health and psychosocial considerations during the COVID-19 outbreak. 2020 Mar 18. Available from: <https://www.who.int/docs/default-source/coronaviruse/mental-health-considerations.pdf>