

The Impact of the COVID-19 Pandemic on Surgeons' and Surgical Residents' Caseload, Surgical Skills, and Mental Health in Kuwait

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Highlights of the Study

- The COVID-19 pandemic had an impact on the psychological welfare of surgeons.
- Surgical training was disrupted by the pandemic.
- Non-Kuwaiti surgeons were more affected by the pandemic when compared to their Kuwaiti colleagues.
- Coping mechanisms needed to be implemented to overcome psychological stressors.
- Virtual learning played a significant role in surgical training during the pandemic.

Keywords

COVID-19 · Mental health · Surgical education · Depression, Anxiety and Stress Scale-21

Abstract

Introduction: The onset of the COVID-19 pandemic resulted in governments implementing new regulations to divert healthcare resources, which in return led to the postponement of elective and semi-elective surgical procedures. Therefore, many surgeons and as well as surgeons in training reported feeling redundant, which eventually resulted in psychological distress. This study aimed to assess the sociodemographic differences in the psychological impact resulting from the COVID-19 pandemic and outline the effect it had on surgical training. **Methods:** This is a cross-sectional study conducted in Kuwait. Data were collected by distributing a questionnaire electronically to surgeons and surgeons

in training. The survey included questions aimed at assessing both the effect of the pandemic on surgical training and the psychological impact it had on surgeons, assessing the latter using the Depression, Anxiety and Stress Scale-21 screening tool. **Results:** The response rate for the study was 52%, with the majority being junior male surgeons. A majority of surgeons in training reported postponement of their scheduled academic teaching sessions (78.9%) and pre-assigned surgical rotations (65.8%). In terms of the psychological impact of the pandemic, a majority of the participants reported an element of depression and stress, 61.2% and 55%, respectively, while approximately half, 48.1%, had symptoms associated with anxiety. **Conclusion:** The COVID-19 pandemic had a negative association with the psychological well-being of a significant proportion of surgeons and associated surgical training programs.

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Introduction

The COVID-19 pandemic induced governments to mitigate and divert healthcare resources to contain the acutely overwhelming burden of disease. Hospitals globally anticipated a surge in admission rates secondary to the COVID-19 infection and had limited healthcare resources given the demand [1–3]. In response to the pandemic, Kuwait's Ministry of Health implemented new regulations to combat the mass effect by executing the interim cancellation of all nonurgent surgical procedures [4]. These changes had numerous effects on surgical practice ranging from staffing issues secondary to the reallocation of doctors and nursing staff, procedural prioritization, risk of infection, surgical training, and psychological distress.

Working in a hospital setting and operating on seropositive patients is a source of distress to surgeons. The uncertainty of the effectiveness of personal protective equipment during surgical intervention, as research on this topic had been scarce and due to the highly infectious nature of the virus and ease of transmissibility, has caused significant stress to healthcare professionals. This could be due to the fear of contracting the virus and risk of spreading the infection to family members at home and vulnerable patients. This, in turn, resulted in physical distancing from family members, which left healthcare workers feeling disconnected, lonely, and isolated [5–11].

It has been previously documented that due to the uncertainty and stigmatization, some healthcare workers reported unwillingness to work, increasing levels of stress, anxiety, and symptoms of depression. Long-term psychological implications are yet to be determined [11].

The purpose of the current study was to investigate significant differences among sociodemographic variables, among surgeons, and the psychological impact during the COVID-19 pandemic. In addition, this study examined the impact of the pandemic on surgical training and the coping mechanisms of surgeons.

Methods

Study Design and Population

This cross-sectional study was conducted between October 2020 and November 2020 in Kuwait. The target population was surgeons of all ranks and subspecialties practicing in the public sector in Kuwait. Three categories of surgeons were included, pre-training, training, and post-training surgeons. The pre-training category includes doctors who have graduated from medical school but have not yet been accepted into a residency program. The training category includes doctors who are surgical residents

in various surgical specialty programs. The post-training category includes established surgeons who have completed their residency programs. Citizenship status (Kuwaiti vs. non-Kuwaiti) was collected taking into consideration associated social factors.

Participants

Data were collected by distributing an electronic questionnaire to surgeons working in Kuwait during the COVID-19 pandemic. The population of interest was identified through their membership in the Kuwait Association of Surgeons (KAS) and SurgQ8 (a subdivision of KAS specialized in providing virtual surgical education). The purpose of the study was explained, and informed consent was obtained at the beginning of the questionnaire.

The Questionnaire

Google Forms were used for the questionnaire. The survey was divided into three main parts. The first part of the survey focused on the participant's sociodemographic characteristics which included age, gender, marital status, nationality, specialty, place of work, and the level of training. The second part addresses surgical training. The third and final part of the survey included the Depression, Anxiety and Stress Scale (DASS; a tool that is used widely to assess the symptoms of each disorder accordingly) [12, 13]. DASS-21 was used in this survey; each question on the DASS-21 form was rated on a 4-point scale depending on the degree of reliability to the aforementioned question, where zero indicates low reliability, and 3 indicates the highest level of reliability. The participants' scores were added up and multiplied by 2 to calculate the final score.

Data Analysis

The data were analyzed using IBM SPSS Statistics version 25 (SPSS Inc., Chicago, IL, USA). The first part of the analysis was a descriptive analysis which included percentages, means, and interquartile ranges; these values were then used for categorical variables for further analysis. To assess for factors associated with a higher DASS-21 score, a linear regression analysis was conducted, while adjusting for confounders such as age, gender, nationality, rank, and marital status.

Results

Participant Sociodemographics

We sent 262 invitations, and 136 (52%) responded. Seven responses were excluded as the participants did not reside in Kuwait or were not surgeons. The study included 129 participants with a mean age of 37 years old (range 24–74). A majority of the participants were male (70.5%), Kuwaiti (70.5%), and married (62.8%). About one-third were in the post-training category. A majority of the participants were general surgeons (74.1%) (Table 1).

Surgical Training

Two-thirds of all residents had their pre-assigned surgical rotations postponed or shortened. In terms of teach-

Table 1. Descriptive analysis of the participants' demographics

Participants' demographics, N = 129	
Age, mean (SD, range)	37.2 (10.2, 24.0–74.0)
Gender, N (%)	
Male	91 (70.5)
Nationality, N (%)	
Kuwaiti	91 (70.5)
Marital status, N (%)	
Married	81 (62.8)
Job title, N (%)	
Junior	83 (64.3)
Specialty, N (%)	
General surgery	96 (74.1)
Other surgical specialties	33 (25.5)

ing sessions, 78.9% of residents had their didactic teaching sessions postponed, and 86.8% had their wet/dry labs teaching sessions deferred. Due to the COVID-19 pandemic, 71.1% of the residents were reallocated to COVID-19 duties. With regard to compensation for the deficit in their surgical training, 81.6% of the surgical trainees stated that small surgical workshops would help compensate for the deficit. They also stated that virtual research sessions (60.5%), surgical webinars (52.6%), and virtual surgical skill workshops (47.4%) would also help in minimizing the deficit (Table 2).

Depression, Anxiety, and Stress Scale-21

The median score for depression was 12.0, anxiety 6.0, and stress scores 12.0 for the entire study sample (Table 3). Sixty-one percent ($n = 79$ out of 129) of the participants demonstrated an element of depression. The majority had mild-to-moderate symptoms of depression, and the remainder of the participants had severe and extremely severe symptoms of depression. Approximately half of the participants reported symptoms of anxiety, and one-third of those had extremely severe symptoms. Fifty-five percent of the participants reported experiencing stress during the pandemic, most of whom had mild symptoms, followed by moderate symptoms, and a similar distribution between severe stress and extreme stress (Table 3).

Difference in DASS-21 Scores

Regression analysis conducted demonstrated that the total DASS-21 score of non-Kuwaiti surgeons was 15.8 when compared to Kuwaiti surgeons, which was statistically significantly different ($p = 0.013$). Although the

Table 2. Descriptive analysis of the residents' views on the impact of the pandemic on surgical training and the resulting coping mechanisms

	N (%)
<i>Effect on surgical training, N = 38</i>	
Cancellation of a previously planned surgical conference	
Yes	33 (86.8)
No	5 (13.2)
Postponed or shortened surgical rotation	
Yes	25 (65.8)
No	13 (34.2)
Postponed or shortened didactic teaching sessions	
Yes	30 (78.9)
No	8 (21.1)
Postponed or shortened wet/dry labs teaching sessions	
Yes	33 (86.8)
No	5 (13.2)
Reallocated surgical or medical COVID-19 duty	
Yes	27 (71.05)
No	11 (28.94)
<i>Residents' proposals in response to training deficiencies, N = 38</i>	
Surgical webinars help compensate the deficiency	
Agree	20 (52.6)
Neutral	11 (28.9)
Disagree	7 (18.4)
Pairing residents with virtual surgery mentors will help compensate for deficits in my surgical training	
Agree	20 (52.6)
Neutral	9 (23.7)
Disagree	9 (23.7)
Small surgical workshops will help compensate for deficits in my surgical training	
Agree	31 (81.6)
Neutral	3 (7.9)
Disagree	4 (10.5)
Virtual surgical skills workshops will help compensate for deficits in my surgical training	
Agree	18 (47.4)
Neutral	5 (13.2)
Disagree	15 (39.5)
Virtual research sessions will help compensate for the deficiency	
Agree	23 (60.5)
Neutral	7 (18.4)
Disagree	8 (21.1)

findings were not statistically significant ($p > 0.05$ for all), there were factors associated with higher DASS-21 scores. With every year increase in age, there was a 0.4 decrease in total DASS-21 score. The total score of unmarried surgeons was 6.4 when compared to those who were married, and senior surgeons (post-training) had a score of 2.9 when compared to their junior colleagues. Female surgeons had a score of 3.2 (Table 4).

Table 3. Descriptive analysis of the participants' score results on the DASS-21 questionnaire

Psychological impact of COVID-19 according to the DASS-21, <i>n</i> = 129	<i>N</i> (%)
Depression	79 (61.2)
Mild	22 (17.1)
Moderate	26 (20.2)
Severe	12 (9.3)
Extremely severe	19 (14.7)
Anxiety	62 (48.1)
Mild	14 (10.9)
Moderate	18 (14)
Severe	8 (6.2)
Extremely severe	22 (17.1)
Stress	72 (55.8)
Mild	33 (25.6)
Moderate	19 (14.7)
Severe	9 (7)
Extremely severe	11 (8.5)
Depression, mean (SD)	13.9 (11.0)
Anxiety, mean (SD)	8.95 (9.12)
Stress, mean (SD)	14.8 (11.2)

A similar trend was seen when individual components of the DASS-21 were compared. Being non-Kuwaiti was associated with higher scores in all 3 components of the DASS-21 when compared to their Kuwaiti colleagues, with *p* values of 0.034 for depression, 0.003 for anxiety, and 0.055 for stress. With increasing age, lower DASS-21 scores were demonstrated in all subsections of the scale. Unmarried surgeons had higher scores in all 3 sections. Senior surgeons had higher scores in all categories when compared to their junior colleagues, and females also scored higher in all subsections when compared to males. Statistical significance was not achieved when comparing other variables in the study (Table 4).

Discussion

The COVID-19 pandemic caused a mass effect and disruption of social norms, the economy, and healthcare organizations [3, 14]. A significant strain was placed on the healthcare system in Kuwait [15]. This resulted in governmental efforts to combat the tension by recommending the momentary postponement of outpatient clinics, nonurgent, and semi-urgent surgical procedures. Other efforts taken to combat the strain included the provisional deferment of academic teaching to virtual educa-

tion, full national lockdowns, and the construction of field hospitals.

The newly implemented regulations and the sudden surge in medical admission rates resulted in surgeons being reallocated to various medical departments or intensive care units [15]. Additionally, there was an interim cancellation of all nonessential procedures followed due to the overwhelming pressure on hospitals, to reduce the risk of transmission of virus to patients and to protect the surgical staff from contracting the infection while performing nonessential procedures [15]. The lack of training and lack of hands-on practice left surgeons in training feeling less confident in their capabilities and competency. This could eventually lead to the loss of acquired surgical skills, a phenomenon known as "surgical skill decay" [16, 17]. The adaptive measures that were undertaken had an impact on the skill level, the quality of education delivered to surgeons in training, and the psychological health of physicians.

Various compensatory tools were adopted to bridge the gap caused by the pandemic in surgical training [18]. The tools that were available and used due to technological advancements included surgical webinars, virtual research sessions, resident-mentor virtual pairing programs, virtual surgical skill workshops, and smaller workshops while abiding with the social distancing rules. Our study demonstrated that 52.6% and 82.6% of surgical residents reported that surgical webinars and small faculty workshops would help compensate for the training deficiencies, respectively. It was also noted that 47.4% and 60.5% of surgeons in training agreed that virtual surgical skill workshops and research sessions would also be beneficial to their continuous learning and education, respectively. Moreover, to further better educational opportunities for those in training, collaboration between different institutions could be offered virtually for surgical trainees [18]. It is also important to acknowledge the concept of surgical skills delay, given the circumstances. The advancement in telemedicine and the potential use of imagery practice could aid in reducing the long-term effects of surgical skill decay and assist in surgical skills retention [16, 18, 19].

It is evident in our study that a high percentage of prospective surgeons felt that they were at a disadvantage with regard to their future prospects, especially enrollment into a training program of their choice. This could be attributed to the fact that a large proportion of them were reallocated to various other departments to participate in tasks that were not within their realm of interest and expertise; studies have demonstrated that the reallo-

Table 4. Adjusted linear regression

Factors associated with increased psychological impact	DASS-21 score	p value	95% CI
<i>Total*</i>			
Age (for every 1-year increase)	-0.444	0.205	-1.127, 0.239
Nationality			
Non-Kuwaiti	15.843	0.013	3.490, 28.196
Marital status			
Not married	6.379	0.319	-6.121, 18.879
Rank			
Senior	2.898	0.66	-10.002, 15.798
Gender			
Female	3.153	0.613	-9.036, 15.342
<i>Depression</i>			
Age (for every 1-year increase)	-0.219	0.098	-0.476, 0.038
Nationality			
Non-Kuwaiti	5.075	0.034	0.430, 9.720
Marital status			
Not married	2.626	0.276	-2.074, 7.326
Rank			
Senior	0.051	0.984	-4.800, 4.901
Gender			
Female	0.436	0.852	-4.147, 5.019
<i>Anxiety</i>			
Age (for every 1-year increase)	-0.055	0.616	-0.268, 0.158
Nationality			
Non-Kuwaiti	5.973	0.003	2.122, 9.824
Marital status			
Not married	1.854	0.353	-2.043, 5.751
Rank			
Senior	0.338	0.869	-3.683, 4.360
Gender			
Female	1.898	0.33	-1.902, 5.697
<i>Stress</i>			
Age (for every 1-year increase)	-0.171	0.216	-0.439, 0.098
Nationality			
Non-Kuwaiti	4.794	0.055	-0.058, 9.647
Marital status			
Not married	1.899	0.45	-3.011, 6.809
Rank			
Senior	2.509	0.334	-2.558, 7.576
Gender			
Female	0.82	0.738	-3.968, 5.608

cation of surgeons was a common practice during the pandemic [20]. This resulted in a decrease in their surgical exposure and loss of opportunity to work alongside their mentors.

The study illustrated high percentages of depression, stress, and anxiety among the participants. Similar findings were demonstrated in studies performed during the COVID-19 pandemic in other countries [21]. Among all three categories of DASS-21, there was a decrease in scores with increasing age; a trend is observed even though the values were not statistically significant, which

can be attributed to the sample size. When comparing Kuwaiti versus non-Kuwaiti surgeons, there is a universal statistically significant increase in scores in non-Kuwaiti surgeons in all categories. The higher scores could be attributed to the fact that they are away from their families and home countries with limited opportunity and access to travel due to the universal lockdown; this has been demonstrated in another study conducted in the Kingdom of Saudi Arabia[22]. Concern for distant loved ones could have also had an impact on the psychological well-being non-Kuwaiti participants. This reflects on the im-

portance of being in a familiar environment and the vitality of having a strong support system when exposed to highly stressful situations. Furthermore, female and unmarried surgeons had higher scores compared to their male and married colleagues, which further supports the importance of having a support system. Similar patterns of scores were demonstrated in another study; their results demonstrated that being a junior, female, and single physician was associated with higher DASS-21 scores [21].

Senior surgeons, those who completed their residency program, reported higher DASS-21 scores compared to their junior colleagues. Kuwait's healthcare system is structured in a way where consultant surgeons have their independent outpatient clinics and elective surgeries. However, given the new restrictions, both of those responsibilities were halted, leaving them feeling redundant. In comparison, the junior surgeons were given more responsibilities in the form of reallocation to various other departments as well as in the same department.

The psychological impact on surgeons during the COVID-19 pandemic is evident. Different strategies should be implemented to address this. Support for staff members from their peers, supervisors, or counselors should be made available. Studies have shown that institutional support has a vital role in opposing the psychological impact of a pandemic [22]. Professional psychological support is effective, and being able to share similar experiences with colleagues will give the physician a sense of comradery. In addition, further resources should be made readily available to physicians in the form of group therapy and information shared on social media platforms on mental health awareness, easily and readily accessible for those who seek it. It has been noted that mindfulness mobile phone applications have been associated with a reduction in states of burnouts and offers strength and resilience to the user [23]. To the best of our knowledge, the current study is one of only a few that has been conducted in Kuwait during the COVID-19 pandemic that examines the association between sociodemographic variables and depression, anxiety, and stress among surgeons and surgeons in training.

Limitations

The following study has several limitations. First, when reviewing the role of the pandemic and its impact on surgical skills and training, the survey was made specifically for this paper, and it was not a standardized questionnaire capable of quantifying the true effect of the pandemic on surgical skills and surgical training. The find-

ings of the analysis should be interpreted with caution as longitudinal follow-up data were not available, and the study was restricted to cross-sectional data. Furthermore, not all the regression analyses were statistically significant, which could be attributed to the limited sample size. Despite that, it is still important for the findings to be documented. However, when doing so, it is imperative to note that there is a risk of type II error when concluding there is no effect, due to the lack of power. Another limitation is the possible introduction of selection bias as there is a possibility that only those who were affected participated in the study; this might have led to an overestimation of our results and whether our results could be applied to the general population. The sequence of the questions on the distributed questionnaire might have affected the DASS-21 score as the DASS-21 questionnaire presented questions regarding surgical training. In terms of the DASS-21 scale, it is a standardized tool used to screen for depression, anxiety, and stress in the general population; however, it is not sufficient to make a formal diagnosis, and further investigations are needed for a complete assessment. The study also did not take into consideration whether the participants had any preexisting mental health issues that might interfere with the results.

Conclusion

The COVID-19 pandemic had an impact on surgical training and the psychological well-being of surgeons. Residents were at a disadvantage as their training was halted and the possibility of surgical skill decay was also a worry among surgeons. Alternative educational tools will have to be adopted to compensate for the deficit in training and maintaining surgical skills. The prominence of the psychological impact of the COVID-19 pandemic on surgeons can be observed. Among those who participated in the study, younger surgeons, those who were single, non-Kuwaiti, and female were most affected.

Public health educational programs and workshops that are designed to encourage psychological well-being among healthcare workers are highly recommended. Programs should also be prepared to provide opportunities for the advancement of nontechnical skills by offering courses on teamwork, crisis management, and residents as educators [19]. Further longitudinal studies are encouraged to examine the prolonged impact of the COVID-19 pandemic on surgeons and surgeons in training mental health well-being as well as their surgical skills.

Statement of Ethics

Ethical approval was obtained from Kuwait University's Ethics Committee as well as the Ministry of Health's Standing Committee for Coordination of Health and Medical Research in Kuwait for the protection of all human subjects. All participants were additionally provided with informed consent at the beginning of the questionnaire.

Conflict of Interest Statement

All the authors declare that there was no conflict of interest.

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Author Contributions

Concept and design: Salman Alsafran, Ahmed Alkhamis, Maha Alsejari, and Salman Alsbah; data collection: Salman Alsafran, Ahmed Alkhamis, and Ali Alkhayat; analysis and interpretation of data: all the authors; drafting of the manuscript: Dalia Albloushi and Danah Quttaineh; statistical analysis: Dalia Albloushi and Danah Quttaineh; critical revision of the manuscript: all the authors.

Data Availability Statement

Data collected for the purpose of this study can be obtained from the corresponding author, upon reasonable request.