Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

International Journal of Surgery Open 27 (2020) 47–51

Contents lists available at ScienceDirect

International Journal of Surgery Open

journal homepage: www.elsevier.com/locate/ijso

Research Paper

Impact of Covid-19 pandemic on surgical practice in Kurdistan, Iraq: An online cross-sectional survey

Nawfal R. Hussein [a], Dildar H. Musa [b], Nashwan Ibrahim [b], Ibrahim A. Naqid [a, *], Zana Sidiq M. Saleem [b], Karwan Jacksi [c]

[a] Department of Biomedical Science, College of Medicine, University of Zakho, Kurdistan Region, Iraq
[b] College of Medicine, University of Duhok, Kurdistan Region, Iraq
[c] Department of Computer Science, University of Zakho, Kurdistan Region, Iraq

ARTICLE INFO

Article history:
Received 15 September 2020
Received in revised form
30 October 2020
Accepted 31 October 2020
Available online 4 November 2020

Keywords:
Impact
COVID-19 pandemic
Surgeons
Kurdistan region
Iraq

ABSTRACT

Introduction: The COVID-19 pandemic is a major challenge to healthcare services in the world. It has negatively impacted surgical practice, and health workers. We aimed to assess the impact of the COVID-19 pandemic on surgical practice in the Kurdistan Region, Iraq.

Methods: An online cross-sectional study using an online survey was performed between 13 April to 29 April, 2020 in the Kurdistan Region, Iraq. An online cross-sectional study using an online survey was performed between 13 April to 29 April, 2020 in the Kurdistan Region, Iraq. A total of 241 surgeons, aged 28–70 years (mean range 22.2 ± 7.9 SD), were recruited to this study. The questionnaire was designed to evaluate the impact of the COVID-19 pandemic on surgeons' practices. Participants completed a self-developed online questionnaire.

Results: The majority of participants (44.39%) were general surgeons, followed by urologists (17.01%). Approximately 82.57% of surgeons performed surgeries during the COVID-19 pandemic and 60.31% undertook emergency surgeries only. There was no significant difference between men and women ($P = 0.41$) and different age groups ($P = 0.08$). Only 28.22% of surgeons had access to full personal protective equipment (PPE), and 41.18% believed that wearing PPEs severely affected their skills. Results also found that surgeons aged between 28 and 34 years were more pledged to the use of PPEs, than other age groups ($P = 0.001$). The use of PPEs during surgeries was significantly higher in the Sulaymaniyah province ($P = 0.001$). The surgical services were also severely impacted in the Sulaymaniyah province than in the other provinces ($p = 0.001$).

Conclusion: The COVID-19 pandemic severely affected surgical practice in the Kurdistan Region, particularly in the Sulaymaniyah province. Males, and young surgeons showed a higher commitment level for using PPE. Additional training and precautions are needed to increase awareness about COVID-19 among surgeons, and the importance of using PPE during surgery.

1. Introduction

COVID-19 pandemic is considered one of the most important healthcare crises in the world. It is an emerging respiratory disease that initially started in Wuhan, China in December 2019 and rapidly spread worldwide [1]. The World Health Organization declared COVID-19 as a global pandemic on 11 March, 2020 [2]. Fever, dry cough, dyspnoea, fatigue, and myalgia are the most significant clinical manifestations of the disease [3]. In Iraq, the first COVID-19 case was diagnosed on the 22nd of February 2020. With the occurrence of the first COVID-19 case in the country, the Kurdistan Regional Government, in the northern Region of Iraq, enforced strict control measures for the infection. These measures involved the cancellation of gatherings and religious ceremonies, closing schools and education institutes, and closing airports, borders and nonemergency services in hospitals [4,5]. In addition, local authorities in the Kurdistan region of Iraq diverted the city's limited staff and resources to cater to COVID-19 patients [6,7]. To confront this worldwide health emergency that overpowered health systems around the world, health authorities had to improvise their

* Corresponding author.
E-mail address: ibrahim.naqid@uoz.edu.krd (I.A. Naqid).

https://doi.org/10.1016/j.ijso.2020.10.014

working to manage with COVID-19, while guaranteeing continuity of care, and protecting medical staff and patients.

At first appearance, surgeons' practices were not considered front-line services within the battle against the COVID-19 pandemic in Kurdistan Region, Iraq, when compared with other specialties including internal medicine, infectious diseases, intensive care physicians. On the other hand, as parts of the larger healthcare system, they play a vital role in reversing this pandemic [8]. In addition, the presence of a large number of people in operating theatres, the close contact of surgeons with patients, and urgent management and treatments have been placed on hold during this critical time because the virus is quickly transmitted and may potentially infect surgical care workers [9]. During the COVID-19 pandemic, there are a huge shortage of personal protective equipment (PPE) supplies, including disposable gloves, gowns, surgical masks, and alcohol-based hand sanitizers in the Kurdistan Region, Iraq. Most of these are due to travel and import restrictions from countries like China, one of the major exporters of PPE supplies to the world. These shortages changed the methods of surgical operation in Kurdistan, Iraq, which resulted in cancelling of all scheduled and elective surgeries. This pandemic disease poses a huge challenge to health care systems around the world, including in the Kurdistan Region [10]. Therefore, the aim of the present study was to assess the impact of the COVID-19 pandemic on surgical practice in the Kurdistan Region, Iraq.

2. Materials and methods

2.1. Study design

This study was conducted in the Kurdistan Region, Iraq, from April 13, 2020 to April 29, 2020, with a total of 241 surgeons being recruited from Duhok, Erbil and Sulaymaniyah provinces. The ages of the participants ranged from 28 to 70 years old (mean range 22.2 ± 7.9 SD). This project was developed using an online self-administered web-based survey generator. The questionnaires were designed to evaluate the impact of the COVID-19 pandemic on surgeons' practices. The questionnaires were distributed to group of surgeons in Kurdistan region, Iraq via specific email or viber, because it was difficult to conduct a public-based national sampling study during the lockdown of the country.

2.2. Measurement

The questionnaires about the impact of COVID-19 on surgical practice were as designed by Ref. [11] with minor modifications. The survey involved various questions. The first part focused on personal demographic characteristics including age, gender, and province, and the second part was about the speciality and years of experience (Table 1). Participants were then asked for specific questions about the use of personal protection, number of surgeries performed during COVID-19, and motivation of the surgeon to work in the management and treatment of COVID-19 patients. They were also asked to report the type of personal protection equipment, such as PPE, available at work for use during surgical operations.

2.3. Statistical analysis

For statistical analysis, data retrieved from the online survey were introduced into Microsoft Excel and then imported into the GraphPad Prism Version 8. The results were expressed as frequencies and percentages. Statistical analysis was performed using the Chi- Square and Fisher Exact Test. The results were considered positive if $p \leq 0.05$.

Table 1
Survey respondents personal and practical demographic characteristics (n = 241).

Personal demographic data	Frequency	Percentage
Age (Years)		
28–34	71	29.46
35–44	109	45.23
>44	61	25.31
Gender		
Male	198	82.16
Female	43	17.84
Province		
Duhok	144	59.75
Erbil	77	31.95
Sulaymaniyah	20	8.3
Practice demographics	**Frequency**	**Percentage**
Speciality		
General surgery	107	44.39
Urology	41	17.01
Orthopaedic surgery	22	9.13
Obstetrics and gynaecology	17	7.05
Cardiothoracic and Vascular Surgery	15	6.22
ENT	15	6.22
[a]Others	24	9.96
Are you a specialist or an SHO under training?		
SHO under training	99	41.08
Specialist	142	58.92
Since how long do you practice surgery?		
1–5 years	45	18.67
5–10 years	77	31.95
10–15 years	55	22.82
15–20 years	24	9.96
≥20 years	40	16.6

ENT; Eye, Nose, Throat.
SHO; senior house officer.
[a] Paediatric surgeon, neurosurgeon, GIT surgery, ophthalmologist, Faciomaxillary.

3. Results

In total, 241 surgeons representing the Kurdistan Region, Iraq, were recruited to the study (Table 1). The mean age of the participants was 22.2 ± 7.9 years. Among the participants, 198 (82.16%) were male and 43 (17.84%) were female (Table 1). The highest number of responders were general surgeons (107/241; 44.39%), followed by urologists (41/241; 17.01%) and orthopaedic surgeons (22/241; 9.13%). Additionally, 31.95% and 22.82% of participants had 5–10 years and 10–15 years of surgical experience, respectively, and about 16.6% had more than 20 years of experience (Table 1).

The majority of the PPE equipment used for personal protection, as marked by 105 survey responders (43.57%), consisting of disposable gloves, disposable gowns, surgical masks, and alcohol-based hand sanitisers (Table 2). About 199 (82.57%) of the participants performed surgical operations during the period of COVID-19 outbreak, and 120 (60.3%) of them undertook emergency surgeries only (Table 2). There was no significant difference between men and women (P = 0.41) and age groups (P = 0.08) in the surgical operations performed, but there was a significant difference between the three provinces (P = 0.001) (Table 3). A total of 142 (58.92%) participants believed that some patients had COVID-19 positivity (Table 2). About 68 (28.22%) of the surgeons used full PPEs with their patients during ordinary surgeries, and 28 (41.18%) of them reported that the use of PPEs severely affected their surgical skills. Our results also revealed that younger surgeons, aged between 28 − 34 years, were more predisposed to using PPE than other age groups (P = 0.001) (Table 3). Ninety-five surgeons (39.42%) reported having operated on confirmed COVID-19 positive cases (Table 2), with statistically significant differences between men and women (P = 0.002) and age groups (P = 0.01) (Table 3).

Table 2
Questionnaire and results.

	Questions	No. (%)
1	What PPE is available at your hospital?	
	Disposable gloves, Disposable gowns	8 (3.32)
	Disposable gloves, Disposable gowns, Surgical masks	32 (13.28)
	Disposable gloves, Disposable gowns, Surgical masks, Alcohol based hand sanitizers	105 (43.57)
	Disposable gloves, Disposable gowns, Surgical masks, Eye protection or face shields, Alcohol based hand sanitizers	24 (9.96)
	Disposable gloves, Disposable gowns, Surgical masks, N95, Alcohol based hand sanitizers	15 (6.22)
	Disposable gloves, Disposable gowns, Surgical masks, N95, Eye protection or face shields, Alcohol based hand sanitizers	20 (8.29)
	Disposable gloves, Surgical masks, Alcohol based hand sanitizers	31 (12.86)
	Disposable gloves, Surgical masks, N95, Eye protection or face shields, Alcohol based hand sanitizers	6 (2.49)
2	During the COVID19 pandemic, do you still perform surgeries?	
	Yes	199 (82.57)
	No	42 (17.43)
2.1	If Q2 yes, which surgeries do you perform?	
	Emergency surgeries	120 (60.31)
	Elective surgeries	79 (39.69)
3	Do you consider that any surgical patient could be COVID19 positive?	
	Yes	142 (58.92)
	No	99 (41.08)
4	Do you wear full PPEs while performing ordinary surgeries?	
	Yes	68 (28.22)
	No	173 (71.78)
4.1	If Q4 yes, does it affect your surgical skills adversely?	
	Yes	28 (41.18)
	No	40 (58.82)
5	As a surgeon, would you operate any confirmed COVID19 case?	
	Yes	94 (39.0)
	No	147 (61.0)
6	As a surgeon, are you involved now in the management team for COVID19 in your institution?	
	Yes	48 (19.92)
	No	193 (80.08)
7	As a surgeon, are you ready to be actively involved in the treatment of COVID19 patients, if needed or ordered to by your institution?	
	Yes	214 (88.8)
	No	27 (11.2)

It was also found that 48 (19.92%) participants were actively involved in the management teams of COVID-19 in the Ministry of Health in Kurdistan, Iraq (Table 2). Age groups between 35 – 44 years old was more significantly involved in the management of COVID-19 than other age groups (P = 0.006) (Table 3). Surprisingly, 214 (88.79%) surgeons were ready to become more actively involved in the treatment of COVID-19 patients (Table 2), but there were no significant differences between gender (P = 0.24), provinces (P = 0.207), and age groups (P = 0.89) (Table 3).

4. Discussion

The coronavirus disease (COVID-19) was first detected in December 2019 in Wuhan, China [1]. After that, the disease rapidly spread to all countries around the world. The COVID-19 pandemic presented one of the major challenges to healthcare services around the world. The widespread impact of this pandemic has affected the general practice of health workers [12]. Particularly, patients requiring aerosol-generating procedures, such as

Table 3
Statistical analysis of a questionnaire according to demographic characteristics.

Questionnaire		Gender		[a]*P* value	Province			[a]*P* value	Age Group (Years)			[a]*P* value
		Men	Women		Duhok	Erbil	Sulaymaniyah		28–34	35–44	>44	
In the period of the COVID19 pandemic, do you still perform surgeries?	Yes	164	35	**0.41**	126	72	0	**0.001**	64	98	36	**0.08**
	No	34	8		18	5	20		7	23	13	
Do you consider that any surgical patient could be COVID19 positive?	Yes	119	23	**0.264**	82	45	15	**0.305**	51	71	20	**0.02**
	No	79	20		62	32	5		19	51	29	
Do you wear full PPEs while performing ordinary surgeries?	Yes	55	13	**0.43**	34	31	17	**0.001**	54	14	0	**0.001**
	No	143	30		110	46	3		5	107	61	
As a surgeon, would you operate on any confirmed COVID19 case?	Yes	69	26	**0.002**	53	31	11	**0.29**	35	47	13	**0.01**
	No	129	17		91	46	9		36	75	41	
As a surgeon, are you involved now in the management team for COVID19 in your institution?	Yes	37	11	**0.205**	23	22	3	**0.07**	7	34	7	**0.006**
	No	161	32		121	55	17		64	88	41	
As a surgeon, are you ready to be actively involved in the treatment of COVID19 patients if needed or ordered to by your institution?	Yes	174	40	**0.24**	125	69	20	**0.207**	64	108	42	**0.89**
	No	24	3		19	8	0		7	14	6	

The results were considered positive if $p \leq 0.05$.
[a] p value was performed using chi-square (Fisher exact test).

endoscopy and laparoscopy, present an increased risk of infection for anaesthesiologist, surgeons, and surgical staff in the operating theatre. In this study, we invited surgeons from different specialities, including general surgeons, urologists, orthopaedic surgeons, obstetricians and gynaecologists, cardiothoracic and vascular surgeons, and ENT surgeons to participate in this survey.

In our study, a majority of the surgeons were still performing surgeries. However, about 60% of the surgeons involved in this study were engaged in emergency surgeries only. The substantial decrease in cold and elective surgeries may be because all governmental hospitals had cancelled operation lists, and furthermore, because the priority was for the preparedness of hospitals to provide care for a high volume of COVID-19 patients. Several studies have shared their experience about the surgical practice during the pandemic of COVID-19. One study conducted in Italy reported the impact of COVID-19 pandemic on the surgical practice [14]. They reported that 86% of emergency surgery cases was decreased compared to the month before the quarantine [14]. Only about 20% of participants were involved in the management team of COVID19 positive patients in their institution. This may be due to their concern of getting the infection and transmitted the virus rapidly to their family member. This may also explain that the COVID-19 has a higher infectivity and fatality rate than other epidemic virus [15]. During the COVID-19 pandemic, there has been a shortage of PPE supplies [13]. This was reflected in our study, as only 28% of our surgeons had access to full PPE. This put surgeons in danger of acquiring the infection. Immediate international co-operation is needed to improve resource allocation and production capacity within and across borders. Unfortunately, due to the lack of proper training in the correct use of PPE, 41% of the surgeons involved in our study believed that wearing PPE negatively impacted their skills. More training is needed, probably starting from undergraduate levels, for the use of PPE. To date, no COVID-19-positive patients have required surgical procedures in our region. Approximately 88% of the surgeons involved in this study showed readiness to provide surgical services for COVID-19 patients.

We found that surgical services were severely impacted in the city of Sulaymaniyah. This is probably due to the large number of cases registered in this city, as the city had the highest number of Covid-19 patients at the time. The use of PPE during surgeries was significantly higher in the city of Sulaymaniyah. This may be due to the higher rate of infection in this city. More training is needed to train surgeons about the importance of the use of PPE in surgeries. Although the older age group is at a higher risk of COVID-19 complications, our study showed that younger doctors had more commitment to the use of PPE. More training is needed to create awareness regarding the complications of COVID-19 among vulnerable groups. In this study, female doctors showed more readiness to perform operations on COVID-19 patients. This is difficult to explain, and more studies are needed to explore this. In this study, we showed that most of the surgeons involved in the care of COVID-19 patients were in the age group of 35–44 years. This is probably due to the experience of these doctors and the ability to protect themselves.

5. Conclusion

To conclude, the surgical services in Sulaymaniyah city were severely impacted by the COVID-19 pandemic. There was a shortage of PPE supplies in the region. Surgical services were severely affected in Sulaymaniyah city due to the high number of patients diagnosed in the city. Young surgeons showed a higher commitment level for the use of PPE. More training and awareness sessions are required to make surgeons aware of COVID-19 transmission and the importance of PPE.

Ethical approval

The study was approved by the Scientific and Ethics Committee, College of Medicine, University of Zakho, Kurdistan region, Iraq.

Funding

No funding/support.

Author contribution

We confirm that the manuscript has been contributed, reviewed and approved by all authors. We further confirm that the order of authors listed in the manuscript has been approved by all of us.

Conflict of interest statement

There is no conflict of interest.

Guarantor

Dr Nawfal R Hussein.
College of Medicine, University of Zakho.
Nawfal.hussein@uoz.edu.krd.
Dr Ibrahim A Naqid.
College of Medicine, University of Zakho.
Ibrahim.naqid@uoz.edu.krd.

Research registration number

This study is online cross-sectional survey study, not required registration of research (NOT involved clinical trials).

1. Name of the registry:
2. Unique Identifying number or registration ID:
3. Hyperlink to your specific registration (must be publicly accessible and will be checked):

Consent

Consent of agreement was obtained from all subjects before data collection.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ijso.2020.10.014.

References

[1] Zhu N, Zhang D, Wang W, Li X, Yang B, Song J, et al. A novel coronavirus from patients with pneumonia in China, 2019. N Engl J Med 2020;382(8):727–33.
[2] WHO. Rolling updates on coronavirus disease (COVID-19) [18/03/2020]; Available from: https://www.who.int/emergencies/diseases/novel-coronavirus-2019/events-as-they-happen; 2020.
[3] Chen N, Zhou M, Dong X, Qu J, Gong F, Han Y, et al. Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study. Lancet 2020;395(10223):507–13.
[4] Hussein N. The impact of COVID-19 pandemic on the elimination of viral Hepatitis in Duhok city, Kurdistan region of Iraq. Hepat Mon 2020;20(5):e104643.
[5] Hussein NR, Naqid IA, Saleem ZSM, Musa DH, Ibrahim N. The impact of breaching lockdown on the spread of COVID-19 in Kurdistan region, Iraq. Avicenna J Clin Microbiol Infect 2020;7(1):34–5.
[6] Hussein NR, Naqid IA, Saleem ZSM, Almizori LA, Musa DH, Ibrahim N. A sharp increase in the number of COVID-19 cases and case fatality rates after lifting the lockdown in Kurdistan region of Iraq. Ann Med Surg 2020;57:140–2.

[7] Hussein NR, Saleem ZS, Musa DH, Ibrahim N, Naqid IA. Impact of COVID-19 on the medical education: experience from Kurdistan region of Iraq. J Med Educ 2020;19(1):e106889.
[8] Ashford R, Nichols J, Mangwani J. Annotation: the COVID-19 pandemic and clinical orthopaedic and Trauma surgery. J Clin Orthop Trauma 2020;11.
[9] Karampelias V, Spanidis Y, Kehagias I. Surgical practice and operative surgical strategies during the COVID-19 pandemic: a commentary. Ann Med Surg 2020;55:47–8.
[10] Hussein NR, Saleem ZM, Ibrahim N, Musa DH, Naqid IA. The impact of COVID-19 pandemic on the care of patients with kidney diseases in Duhok City, Kurdistan Region of Iraq. Diab Metabol Synd: Clin Res Rev 2020.
[11] Meraghni N, Bouyoucef H, Benkaidali R, Hamza A. Impact of the COVID-19 pandemic on orthopedic surgical practice: international study. Res Square 2020.
[12] Viswanath A, Monga P. Working through the COVID-19 outbreak: rapid review and recommendations for MSK and allied heath personnel. J Clin Orthop Trauma 2020;11(3):500–3.
[13] Rait JS, Balakumar C, Montauban P, Zarsadias P, Iqbal S, Shah A. COVID-19 and surgery: running on good will or guilt? (2012) Ann Med Surg 2020;55. 69-69.
[14] Shi Y, Wang J, Yang Y, Wang Z, Wang G, Hashimoto K, et al. Knowledge and attitudes of medical staff in Chinese psychiatric hospitals regarding COVID-19. Brain Behav Immun Health 2020;4:100064.
[15] Burki T. Global shortage of personal protective equipment. Lancet Infect Dis 2020;20(7):785–6.