RESEARCH ARTICLE

COVID-19 and Surgical Preparedness

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Abstract

Aim and objective: The rapid and large-scale spread of coronavirus disease-2019 (COVID-19) pandemic has become a major cause of concern for healthcare professionals. The purpose of this study was to determine the preparedness of surgical specialty personals in managing surgery during COVID-19 pandemic.

Materials and methods: The present study was conducted online from May 5, 2020, to June 5, 2020, through a predesigned and pretested questionnaire-based proforma on the preparedness of surgical practice related to COVID-19 infection circulated through Google Forms. The participants selected were serving in Punjab and holding allopathic degrees in any of the surgical specialties. Exclusion criteria were responses by nonsurgical specialists and incompletely filled proforma. A total of 412 responses were received, out of which 318 were valid responses in terms of completeness of proforma. The data so collected were compiled and statistically analyzed by SPSS v.21 (IBM).

Results: Three-hundred and eighteen received responses were analyzed. Mean age was 42.3 ± 10 years. Male-to-female ratio was 2.38:1. Majority of the respondents were from general surgery specialty 130 (40.8%). Two-hundred and thirty-eight respondents were from private sector and 80 from public sector. One-hundred and sixty-six (52.2%) respondents reported existence of standard protocols and triage for COVID-19 at their workplace. Two-hundred and fourteen (67.2%) respondents stated that they usually get patients tested for COVID-19 before elective surgery. Two-hundred and seventeen (68.2%) of the respondents reported checking out the correct sequence of donning and doffing the personal protective equipment (PPE). Of the 170 respondents who had consumed hydrochloroquine as recommended by the Indian Council of Medical Research (ICMR), 114 (67%) were private practitioners and 56 (32.9%) were public healthcare sector professionals.

Conclusion: Surgical community need guidelines on how to deliver surgical services safely and successfully during COVID-19 pandemic.

Keywords: COVID-19 pandemic, COVID-19 and Punjab, Healthcare professionals, Surgical workforce.

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Introduction

The world has been reeling under the effects of coronavirus disease-2019 (COVID-19) since the beginning of the year 2020—a year which was to be a landmark year for achievement of multiple targets of the sustainable development goals. The COVID-19 pandemic has also shown us that the world is truly one, both in terms of the havoc it has caused and in the solidarity the world has shown in combating the pandemic. It has demonstrated that the very basic principles of primary healthcare are the only principles through which the end of the pandemic can be sought. It has underlined the fact that no one is safe until everyone is safe.

Most of the world, including India, has been under repeated episodes of partial or complete lockdown to contain the spread of the pandemic while buying time to shore up their healthcare resources and healthcare infrastructure. While every effort was made during lockdowns to protect the smooth delivery of essential services like health services, huge lapses were identified. This paper is an attempt to quantify the gaps in the delivery of surgical interventions and procedures during the lockdown period.

India is a federation of 28 states and 8 union territories. Punjab is one of the states of India with a population of almost 2.7 crores as per the Census of India 2011. There is one doctor for every 789 Punjabis, the ratio being one of the healthiest doctor–patient ratios in the country.[1] There are 20 districts in Punjab where both the public sector and the private sector play a pivotal role in the delivery of healthcare services. There are 2076 medical institutions in the state out of which 636 have broad specialities.[2] There are 51685 registered medical practitioners with Punjab state medical council as on June 30, 2020.[3] No parallel figures were available for the private sector.

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Materials and Methods

The present study was conducted online from May 5, 2020, to June 5, 2020, through a predesigned and pretested proforma circulated through Google Forms. The participants selected were serving in Punjab and were functional professionally in either public or private healthcare sectors and holding allopathic degrees in any of the surgical specialties. The purpose of the study was explained to the participants, their consent was taken, and the confidentiality of the information was assured. Institutional ethical clearance was taken for the study. Exclusion criteria were responses by nonsurgical specialists and incompletely filled proforma. A total of

412 responses were received, out of which 318 were valid responses in terms of completeness of proforma. The data so collected were compiled and statistically analyzed by SPSS v.21 (IBM).

Results

Three-hundred and eighteen responses received were analyzed. Mean age of the responding surgical specialist was 42.3 ± 10 years. Male-to-female ratio of the respondent was 2.38:1 (male = 224, female = 94). Most of the respondents, i.e., 168 (52.8%), were aged between 40 and 59 years (Table 1). Majority of the respondents, i.e., 130 (40.8%), were from general surgical specialty (Table 2) followed by ophthalmology 42 (13.2%), obstetrics and gynecology 37 (11.6%), orthopedics 35 (11.0%), and otolaryngology 32 (10.0%). One-hundred and twenty-two out of 224 male respondents were general surgeons and 37 out of 94 female respondents were practicing in obstetrics and gynecology.

The respondents were further categorized into two sectors—private (n = 238) and public health (n = 80)—to assess the level of preparedness for performing surgical procedures and interventions in the COVID-19 pandemic (Table 3). As far as the health institutional infrastructure and policies were concerned, 166 (52.2%) respondents reported the existence of standard protocol and triage for COVID-19 at their workplace. On comparing this between public and private sectors, the probability of following these standard protocols and triage for COVID-19 in practice was 1.68 times higher among private practitioners—132 (79.5%) cases, than among those in public healthcare personel—34 (20.4%) cases. The difference was statistically significant (p = 0.02).

One-hundred and forty-three (44.9%) respondents reported the presence of dedicated COVID-19 recovery wards. This response number was significantly higher in private healthcare providers, i.e., 118 (82.5%), than in public healthcare providers, i.e., 25 (17.4%), p = 0.006.

Just 34 (10.6%) of the respondents admitted to having a negative-pressure operation theater and 15 (4.7%) of the respondents claimed to have separate staff for operating COVID-19 suspected or confirmed cases. However, no statistically significant difference was found between public and private care in relation to the availability of negative-pressure operation theater (p = 0.2) and dedicated separate auxiliary staff for COVID-19 surgeries (p = 0.07).

Two-hundred and fourteen (67.2%) respondents stated that they usually get patients tested for COVID-19 before elective surgery (Table 4). This response was largely from the private healthcare providers, i.e., 192 (89.7%), as compared to public healthcare providers, i.e., 22 (10.2%). The likelihood of presurgery testing for COVID-19 was 11.04 times higher in private healthcare responders, and the difference was found to be highly statistically significant (p = 0.00). Twenty-six (83.8%) participants from private sectors affirmed that they perform elective surgeries with basic minimum surgical team compared with five (16.1%) participants from public sectors, and the difference was statistically not significant (p = 0.11).

Two-hundred and seventeen (68.2%) respondents reported checking out the correct sequence of donning and doffing the personal protective equipment (PPE). One-hundred and sixty-three (75.1%) private hospital respondents and 54 (24.8%) public hospital respondents were following the correct procedure and sequence for donning and doffing PPE. The difference was found to be statistically nonsignificant (p = 0.43). About 62.2% complained about impaired visual acuity due to repeated fogging while wearing PPE during surgery.

Of the 43 respondents who stated that they had cut down on aerosol-generating procedures, 32 (74.4%) were in private sector and 11 (25.5%) in public sector. No statistically significant difference was found in these two groups in terms of deliberate lessening of aerosol-generating procedures (p = 0.46). Fifteen (63.5%) participants from private sector have deferred surgery

Table 1: Distribution of the respondents according to the age and sex

Age (years)	*Males*	*Females*	*Total*
20–39	21 (61.7%)	13 (38.2%)	34 (10.6%)
40–59	116 (69.0%)	52 (30.9%)	168 (52.8%)
60–79	87 (75.0%)	29 (25.0%)	116 (36.4%)
Total	224 (70.4%)	94 (29.5%)	318 (100%)

Table 2: Study subjects according to their surgical specialty and sex

Surgical specialty	*Males*	*Females*	*Total*
Surgery	122 (93.8%)	8 (6.1%)	130 (40.8%)
Orthopedics	34 (97.1%)	1 (2.8%)	35 (11.0%)
Ophthalmology	27 (64.2%)	15 (35.7%)	42 (13.2%)
Otolaryngology	18 (56.2%)	14 (43.7%)	32 (10.0%)
Obstetrics and gynecology	0	37 (100%)	37 (11.6%)
Dentistry	04 (50.0%)	04 (50.0%	08 (2.5%)
Others (anesthesia)	19 (55.8%)	15 (44.1%)	34 (10.6%)
	224 (70.4%)	94 (29.5%)	318 (100%)

Table 3: Distribution of the respondents according to infrastructure and SOP preparedness for surgical interventions during COVID-19

Infrastructure and SOPs preparedness for COVID-19	*Private sector respondent (n = 238)*	*Public sector respondents (n = 80)*	*OR (CI)*	*p value*
Standard protocol and triage for COVID-19 at workplace (n = 166), i.e., 52.2%	132 (79.5%)	34 (20.4%)	1.68 (1.01–2.81)	0.02
Dedicated COVID-19 recovery and wards (n = 143), i.e., 44.9%	118 (82.5%)	25 (17.4%)	2.16 (1.27–3.70)	0.006
Negative-pressure operation theaters and anterooms (n = 34), i.e., 10.6%	29 (85.2%)	5 (14.7%)	2.08 (0.77–5.57)	0.2
Separate paramedical and axillary staff for operating COVID-19 patients (n =15), i.e., 4.7%	14 (93.3%)	1 (6.7%)	4.9 (0.6–38.2)	0.07
Have verified the correct procedure and sequence for donning and doffing PPE (n = 217), i.e., 68.2%	163 (75.1%)	54 (24.8%)	1.04 (0.60–1.79)	0.43
Impaired vision due to fogging N = (198) 62.2%	147 (%)	51 (%)	0.91 (0.54–1.55)	0.42

Table 4: Practices for COVID-19 protection

	Private sector respondents (n = 238)	*Public sector respondents (n = 80)*	*OR (CI)*	*p value*
Patients tested for COVID-19 before elective surgery (*n* = 214), i.e., 67.2%	192 (89.7%)	22 (10.2%)	11.04 (6.11–19.76)	0.000
Taken/intend to take hydrochloroquine recommended by ICMR (*n* = 170), i.e., 53.4%	114 (67.0%)	56 (32.9%)	0.39 (0.22–0.67)	0.0007
Taking immunity boosters (*n* = 213), i.e., 66.9%	165 (77.4%)	48 (22.5%)	1.50 (0.81–2.58)	0.06
Operating with basic minimum surgical team (*n* = 31), i.e., 9.7%	26 (83.8%)	5 (16.1%)	1.83 (0.68–4.96)	0.11
Cut down on aerosol-generating procedures (*n* = 43), i.e., 13.5%	32 (74.4%)	11 (255%)	0.97 (0.46–2.03)	0.46
Prefer open surgery to laparoscopic surgery (*n* = 62), i.e., 19.4%	36 (58.0%)	26 (42.0%)	0.37 (0.20–0.66)	0.0006
Usually defer elective surgery due to COVID-19 scare (*n* = 24), i.e., 5.9%	15 (62.5%)	09 (37.5%)	0.5 (0.22–1.26)	0.08

compared to nine (37.5%) from public sector due to COVID-19 scare (p >0.05). Thirty-one participants (9.7%) were operating with minimum surgical team, 26 (83.8%) public sector, and 5 (16.1%) private sector ($p = 0.11$).

A total of 62 respondents implied that they would prefer open surgery to laparoscopic surgery of which 36 (58%) were in private sector and 26 (42%) in public sector. Surgical practitioners in private sector were less likely to prefer open surgery to laparoscopic surgeries OR = 0.37 (0.20–0.66), and the difference was found to be highly statistically significant (p <0.001).

Of the 170 respondents who had consumed hydrochloroquine as recommended by the Indian Council of Medical Research (ICMR), 114 (67%) were private practitioners and 56 (32.9%) were public healthcare sector professionals. The odds of the health providers in public sector consuming hydrochloroquine were 0.39 times lesser than those in private sector, and the difference in consumption of hydrochloroquine was highly significant among the two groups (p <0.001). However, no statistically significant differences were found in the two groups as far as the consumption of immunity boosters was concerned ($p = 0.06$).

Discussion

The COVID-19 infection caused by severe acute respiratory syndrome coronavirus-2 (SARS-COV-2) after its origin in China in December 2019 has overwhelmed the healthcare systems across the world.[4] A major challenge for the surgical society is to maintain the provision of essential services while at the same time preserving the precious resources and preventing exposure to healthcare personal.[5] The Indian Government declared complete lockdown on March 24 with further extension till May 4 on April 14.[6] Initially all the elective surgery work both in private and public sector was suspended completely. This impact of COVID-19 on surgeons' daily practice and education was profound. This study is an online survey with the aim to know the status of preparedness of surgical community in conducting routine work in the ongoing pandemic. Response of 318 participants (238 private sector and 80 public sector) were analyzed.

In our study, mean age of the respondents was 42.3 ± 10 years, with 40.8% of respondents from general surgery specialty. As expected large number of participants were male with a male-to-female ratio of 2.38:1. Our study has shown that only 52.2% of participants in their surgical setup affirmed to have standard protocols and triage for COVID-19 patients, further private sector is 1.68 times more likely to have protocol surgical management of COVID-19 cases compared to public sector ($p = 0.02$). Similarly, 44.9% of the respondents reported the presence of dedicated COVID-19 postsurgery recovery wards. This facility was more with private sector participants—118 (82.5%), as compared to public healthcare providers—25 (17.4%), $p = 0.006$.

In view of aerosol transmission of COVID-19, a dedicated operation theater with negative pressure is required.[7] In our study, we found that just 34 (10.6%) of the respondents admitted to having a negative-pressure operation theater, and there was no statistically significant difference between public and private care in relation to availability of negative-pressure operation theater ($p = 0.2$). Considering the logistics and cost involved in redesigning operation theater complexes with negative-pressure facility, it seems to be a near impossible recommendation to implement. The UK and Ireland surgeon colleges have recommended to stop positive-pressure ventilation during the procedure and 20 minutes after the patient has left the operation theater.[8] The risk of surgical smoke has been recognized since a long time, advent of COVID-19 has brought into sharp focus again.[9] Apart from operating room setup, theater personnel and surgical equipment are other means to manage harmful effect of smoke. Mowbray et al.[10] have discussed various filters, extractors, and nonfilter devices to manage surgical smoke. In our analysis, 43 respondents stated to have cut down on aerosol-generating procedures of these majority 32 (74.4%) were in private sector as compared to 11 (25.5%) in public sector. No statistically significant difference was found in these two groups ($p = 0.46$). Various surgical associations have recommended a minimum number of operating room staff while performing surgeries.[11,12] In our study, 9.7% of the respondents confirmed to be following operation with minimum staff members ($n = 31$). Larger number was from private sector—26 (83.8%), in comparison with private sector—5 (16.1%). However, the difference was statistically insignificant ($p = 0.11$).

The risk of airborne transmission of virus is a possibility in both open and laparoscopic surgeries because both have propensity to generate aerosols. Li et al. suggested that risk in open surgery is less as artificial pneumoperitoneum is not created.[13] The UK and intercollegiate board[14] has stated that "laparoscopy is considered to carry some risks of aerosol-type formation and infection and

considerable caution is advised." However, the level of risk is unknown. Thirty-six (58%) of the respondents in the private sector and 26 (42%) in the public sector implied that they would prefer open surgery to laparoscopic surgery. Surgical practitioners in private sector were less likely to prefer open surgery to laparoscopic surgeries OR = 0.37 (0.20–0.66), and the difference was found to be highly statistically significant (p <0.001).

Fifteen (63.5%) participants from private sector have deferred surgery compared to nine (37.5%) from public sector due to COVID-19 scare (p >0.05).

As stated, early initial response was to halt elective procedure in the interest to preserve resources and aid in preventing further spread of disease. In our study, 62.5% of private practitioner compared to 37.5% of public sector surgeons deferred elective surgery with the statistical significant difference between two groups ($p = 0.08$).

In vitro studies have shown chloroquine to be effective against severe acute respiratory syndrome-associated coronavirus (SARS-COV).[15] Chloroquine was suggested as drug for treating SARS during epidemic.[16] However, due to lack of double-blind randomized control study, the true efficacy of chloroquine in treating coronavirus was never established. Chloroquine and its related drugs were tentatively included among drugs for use in containing the burden of COVID-19.[17] Hydroxychloroquine 400 mg twice a day on day 1and then 400 mg once a week thereafter have been recommended for asymptomatic healthcare workers taking care of suspected or confirmed COVID-19 patients as per the guidelines of ICMR.[18] In our study, 170 respondents had consumed hydrochloroquine as recommended by ICMR—114 (67%) were private practitioners and 56 (32.9%) were public healthcare sector professionals. The odds of the health providers in public sector consuming hydrochloroquine were 0.39 times lesser than those in private sector, and the difference in consumption of hydrochloroquine was highly significant among the two groups (p <0.001). However, no statistically significant differences were found in the two groups as far as consumption of immunity boosters was concerned ($p = 0.06$).

Various guidelines have recommended to get reverse transcription–polymerase chain reaction (RT-PCR) for COVID-19 done before elective surgery. However, it may not be feasible in every situation due to the lack of enough resources for testing. As found in our survey, only 67.2% got it tested before surgery. Our study has shown that more private sector surgeons got it tested—192 (89.7%) compared to public sector surgeons—22 (10.2%). The difference was statistically significant ($p = 0.00$).

Surgeons who remain in close contact with patients' body fluids while performing surgical procedures are therefore at increased risk of exposure and contracting COVID -19 infection.[19,20] The PPE is required with proper donning and doffing for adequate protection. Adequate use of PPE depends not only upon the availability but also on comfort and training.[21,22] The use of PPE during surgery raised concerns about its impact on surgery performance, overall comfort, and surgeon fatigue. In our study, 62.2% of surgeons reported impaired vision and difficulty in performing surgery. Carlos et al. in their study reported that 54% of the surgeons felt hampering of surgery performance with PPE.[23] Proper technique and sequencing should be adhered while donning and doffing PPE to prevent getting infected with COVID-19. Two-hundred and seventeen (68.2%) of the respondents reported checking out the correct sequence of donning and doffing the PPE. Our survey has showed that 217 (68.2%) were aware of the correct sequence of donning and doffing the PPE. One-hundred and sixty-three (75.1%) of private hospital respondents and 54 (24.8%) of the public hospital respondents were following the correct procedure and sequence for donning and doffing the PPE. The difference was found to be statistically nonsignificant ($p = 0.43$). In a questionnaire-based survey among the medical students and healthcare professionals in Urban Mumbai, Modi et al.[24] found adequate awareness in 71.2% of the individuals. We recommend the help of various online resources available for adequate guidance.[25,26] Occupational health and safety are of paramount importance to minimize the risk of transmission to surgical professionals and to provide optimum care to patients.

One of the limitations of this study was that the nonresponse rate could not be calculated. However, since our survey is anonymous, we believe that the participants were truly honest in responding.

Conclusion

The COVID-19 pandemic has profoundly impacted the surgeons' daily practice. Surgical services vary widely depending upon local and regional variation and health system configuration. There is a need to implement periodic educational interventions and training programs on surgical practice in reference to COVID-19 pandemic.

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