

# Impact of COVID-19 Pandemic Forced Lockdown on Non-COVID Super-specialty Surgical Case Management in India

Rahul R<sup>1</sup>, Priyank Yadav<sup>2</sup>, Asish Singh<sup>3</sup>, Pawan Verma<sup>4</sup>, Sabaretnam Mayilvaganan<sup>5</sup>, Vijai D Upadhyaya<sup>6</sup>, Ankur Bhatnagar<sup>7</sup>, Shantanu Pande<sup>8</sup>, Mandakini Pradhan<sup>9</sup>, Rajan Saxena<sup>10</sup>

## ABSTRACT

**Introduction:** The nationwide lockdown in India and diversion of healthcare resources toward COVID care have hampered the non-COVID care. In this study, we assessed the effect of the first 6 weeks of lockdown on non-COVID super-specialty surgical case management at a tertiary care center.

**Materials and methods:** This was an observational study involving eight surgical specialties (cardiothoracic and vascular surgery (CVS), Endocrine Surgery, maternal and reproductive health [MRH], Neurosurgery, Pediatric Surgery, Plastic Surgery, Surgical Gastroenterology, and Urology). Information was gathered using two forms: (a) Patient-wise form for surgical procedure (preoperative preparation, anesthesia, and surgical details) (b) Department-wise summary of procedures for comparison with the last year's records.

**Results:** During the study period, 112 cases were performed compared to 1,062 performed last year during the same time frame. CVS department experienced the greatest decline (98%) in cases. Except for COVID testing, no difference in practice was documented (preoperative investigation and anesthesia preference). However, majority of the procedures were performed by an open technique. The use of personal protective equipment (PPE) by anesthetists and surgeons was not widespread and uniform across various specialties; the level of comfort was low suggested by low acceptance. Duration of surgery as well as hospital stay did not increase due to the COVID pandemic.

**Conclusion:** The nationwide lockdown resulted in a marked reduction in the number of non-COVID surgeries, much more than the diversion of the workforce toward COVID facilities. The number of procedures decreased to <20% than in the previous year. The use of PPE was not consistent during procedures on COVID-negative patients.

**Keywords:** Lockdown, Non-COVID care, Pandemic, Surgical case management.

*Indian Journal of Endocrine Surgery and Research* (2021): 10.5005/jp-journals-10088-11174

## INTRODUCTION

The exponentially rising, confirmed cases of coronavirus disease-19 (COVID-19) is a big challenge to the healthcare system worldwide. This pandemic entails preparations and execution on war footing to overcome the crisis. The infection is highly contagious and is known to disseminate through fomites and aerosols.<sup>1</sup> The long incubation period of 1–14 days, potential transmission during the incubation, and limited resources (screening and personal protection kits) pose a high risk of dissemination of COVID-19 to the healthcare workers (HCWs) when managing suspected or infected patients.<sup>2,3</sup> It increases the perioperative risks of elective surgical procedures as well.<sup>4</sup> Such extraordinary circumstances have called for unprecedented decisions in order to mitigate the adverse events of the pandemic. The lawmakers were forced to implement lockdown in various countries. In India, the nationwide lockdown was announced in the last week of March 2020 (March 25, 2020) and then further extended without a break till the first week of May (May 03, 2020). Although the lockdown was not completely withdrawn after that, there were certain relaxations for services other than the essential ones. The lockdown controlled the rapidity of the spread of infection and hence provided time for preparedness to face the tide of mounting COVID cases with limitations of the existing healthcare system. The health community has been pivotal in developing centers in order to provide maximum output with minimum risk to the HCWs. This included the development of isolation wards and intensive care units, training of the healthcare

<sup>1,3,10</sup>Department of Surgical Gastroenterology, Sanjay Gandhi Post Graduate Institute of Medical Sciences, Lucknow, Uttar Pradesh, India

<sup>2</sup>Department of Urology, Sanjay Gandhi Post Graduate Institute of Medical Sciences, Lucknow, Uttar Pradesh, India

<sup>4</sup>Department of Neurosurgery, Sanjay Gandhi Post Graduate Institute of Medical Sciences, Lucknow, Uttar Pradesh, India

<sup>5</sup>Department of Endocrine Surgery, Sanjay Gandhi Post Graduate Institute of Medical Sciences, Lucknow, Uttar Pradesh, India

<sup>6</sup>Department of Pediatric Surgery, Sanjay Gandhi Post Graduate Institute of Medical Sciences, Lucknow, Uttar Pradesh, India

<sup>7</sup>Department of Plastic Surgery, Sanjay Gandhi Post Graduate Institute of Medical Sciences, Lucknow, Uttar Pradesh, India

<sup>8</sup>Department of Cardiovascular and Thoracic Surgery, Sanjay Gandhi Post Graduate Institute of Medical Sciences, Lucknow, Uttar Pradesh, India

<sup>9</sup>Department of Maternal and Reproductive Health, Sanjay Gandhi Post Graduate Institute of Medical Sciences, Lucknow, Uttar Pradesh, India

**Corresponding Author:** Sabaretnam Mayilvaganan, Department of Endocrine Surgery, Sanjay Gandhi Post Graduate Institute of Medical Sciences, Lucknow, Uttar Pradesh, India, e-mail: drretnam@gmail.com

**How to cite this article:** Rahul R, Yadav P, Singh A, *et al.* Impact of COVID-19 Pandemic Forced Lockdown on Non-COVID Super-specialty Surgical Case Management in India. *Indian J Endoc Surg Res* 2021; 16(2):70–76.

**Source of support:** Nil

**Conflict of interest:** None

providers, procurement of personal protection kits, improvement in screening methods, and the care of non-COVID patients.

One of the most striking aspects of reorganization of medical infrastructure to tackle the COVID crisis is the truncation of elective surgeries with a focus only on emergency or semi-emergency cases.<sup>5</sup> This has taken a huge toll on patients needing elective surgery. It is estimated that the COVID crisis has led to the cancellation of over 580,000 surgeries in India alone.<sup>6</sup> The total number of COVID-related deaths in India in the first 3 months is less than the deaths due to cardiovascular causes in India in a single day.<sup>7</sup> With the non-emergency and non-COVID surgeries taking a serious hit, a major part of the population have been left uncared for. The situation became worse for patients who require expert surgical care that cannot be provided at the level of primary healthcare facilities. Hence, we undertook this study at a super-specialty center in North India to see the trends and challenges confronted during the execution of surgical procedures during the first 6 weeks of the lockdown period.

## MATERIALS AND METHODS

This was an observational study conducted at a tertiary care hospital in Northern India. Institute's ethical committee approval was obtained to conduct the study (IEC Code: 2020-125-IP-EXP-18). It included patients who were operated on across eight surgical specialties during the first 6 weeks of National lockdown (March 25, 2020–May 03, 2020). The participating departments were cardiothoracic and vascular surgery (CVS), Endocrine Surgery, maternal and reproductive health [MRH], Neurosurgery, Pediatric Surgery, Plastic Surgery, Surgical Gastroenterology, and Urology. The management of patients was not altered by the study and only the prevalent practices were noted using two types of forms:

- To be filled for each patient undergoing surgery in the department (i.e., patient-specific form) and
- To be filled by each department as a summary statement (i.e., department-specific form).

The patient-specific form solicited information on (a) preoperative preparation for surgery, (b) anesthesia concerns related to surgery, and (c) modifications in surgical practice for the case. The questions were designed to gain insight into how the different specialties dealt with the apprehensions of a possible

COVID infection and how easy was it for them to do so. The department-specific summary form summed up the number of cases in the same department during the same period a year ago besides listing the reduction in manpower due to reallocation to COVID wards.

## RESULTS

During the first 6 weeks of nationwide lockdown, a total of 112 procedures were performed across eight surgical specialties. Compared to the same period 1 year ago (when 1,062 procedures were performed), there was a stark fall in the number of cases (Fig. 1). For this, two reasons were stated by the participating departments: first, patients who were dated for the procedure could not come due to lockdown, and second, patients with benign pathologies were contacted over the phone and asked to postpone travel until the end of lockdown. Those who were admitted prior to the enforcement of lockdown and those who were able to come to the hospital even after lockdown were posted for surgery and were not denied treatment. Since a number of doctors, nurses, and other staff were diverted to COVID-related duties, the effective strength of healthcare workers is also reduced as seen in Figure 2.

The number of elective and emergency cases has varied widely across the various specialties (Table 1). No elective surgery was performed by the departments of Pediatric Surgery and CVS. On the other hand, nearly 95% of the cases performed by endocrine surgeons were elective in nature. A similar pattern was observed in Urology. This was because the majority of procedures in Urology and Endocrine Surgery included double J stent removal and chemoport insertion, respectively, which were performed under local anesthesia without the risk of aerosol generation. Nearly 55% of cases in MRH were operated electively in view of predefined indications, such as a previous history of cesarean section and cephalopelvic disproportion. Two patients had missed abortion. Comparative numbers of elective and emergency surgery in the pre-COVID era are mentioned in Table 1.

The results of consolidated patient-specific forms from each department can be seen in Table 2. In preoperative preparedness, most of the departments routinely performed COVID testing before surgery. Few patients who did not get tested were those who did not have symptoms suggestive of COVID infection or travel history or contact with a COVID patient. Essentially, the

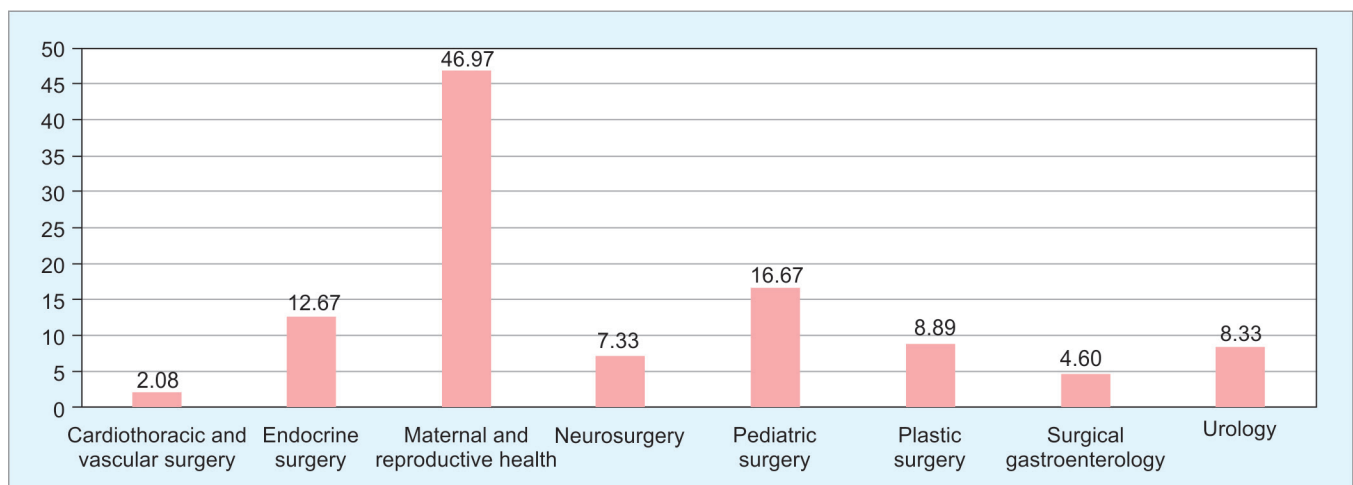


Fig. 1: Fall in cases

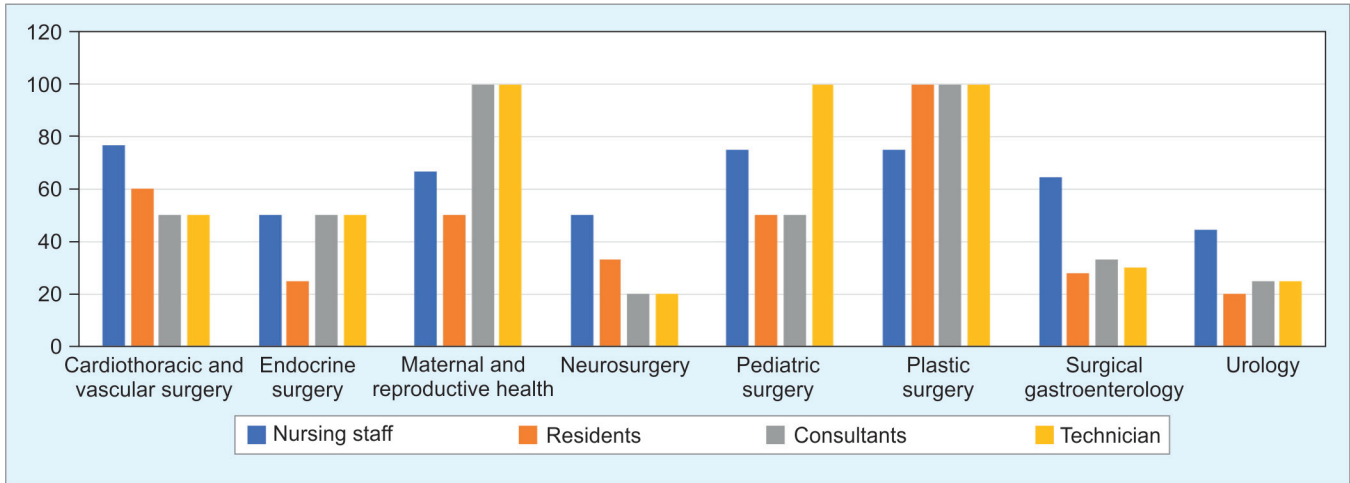


Fig. 2: Effective strength of healthcare workers

Table 1: Number of elective and emergency cases

	<i>Surgical gastroenterology</i>	<i>Urology</i>	<i>Neurosurgery</i>	<i>Endocrine surgery</i>	<i>Pediatric surgery</i>	<i>Cardiothoracic and vascular surgery</i>	<i>Plastic surgery</i>	<i>Maternal and reproductive health</i>
1 Average number of surgeries in the pre-lockdown period in 1 week (emergency/elective)—data from previous years' audit	29	48	25	25	8	16	15	11
Emergency cases	3	6	6	0	1	0	—	5
Elective cases	26	42	19	25	7	16	—	6
2 Total number of surgeries in the lockdown period (6 weeks)	9	24	11	19	8	2	8	31
Emergency cases	1	20	2	18	0	0	7	14
Elective cases	8	4	9	1	8	2	1	17
3 Reason for the change in number of cases	A, B	A, B	A	B	A, B	A, B	B	A
4 Reduction in staff, residents, and consultants in operation theater								
Number of nursing staff (previous/present)	(17/11)	(18/8)	(2/1)	(14/7)	(8/6)	(39/30)	(8/6)	(6/4)
Number of residents (previous/present)	(18/5)	(15/3)	(3/1)	(4/1)	(2/1)	(5/3)	(1/1)	(2/1)
Number of consultants (previous/present)	(3/1)	(4/1)	(5/1)	(2/1)	(2/1)	(2/1)	(1/1)	(1/1)
Number of technicians and other support staff (previous/present)	(10/3)	(12/3)	(15/3)	(6/3)	(3/3)	(6/3)	(3/3)	(3/3)
5 Any separate operation theater for emergency cases	No	No	No	No	No	No	No	No

A, Patients did not turn up; B, Contacted and asked to come later

tests were based on comprehensive triage in the first 10 days of lockdown when the testing rates across the country were very low and a uniform protocol was lacking. After 10 days of the start of lockdown, all the departments ensured a COVID testing before

surgery. However, one child with testicular torsion was operated on by the Urology Department while the COVID report was still awaited as it was an emergency. The surgery was performed with full preparation including PPE for everybody in the operating room

**Table 2:** Results of consolidated patient-specific forms

<i>Preoperative preparation</i>	<i>Surgical gastroenterology (n = 9)</i>	<i>Urology (n = 24)</i>	<i>Neurosurgery (n = 11)</i>	<i>Endocrine surgery (n = 19)</i>	<i>Pediatric surgery (n = 8)</i>	<i>Cardiothoracic and vascular surgery (n = 2)</i>	<i>Plastic surgery (n = 8)</i>	<i>Maternal and reproductive health (n = 31)</i>
<b>Preoperative COVID tests</b>								
Negative	7	8	9	7	7	2	6	20
Not done	2	16	2	12	1	0	2	11
Reason for not doing if not done	Repeated in the same admission	No clear-cut protocol (13); no symptoms or history of contact (2); emergency surgery (1)	No symptoms or history of contact (2)	No clear-cut protocol (12)	Admitted before lockdown	NA	Reoperated in same admission	No protocol (11)
Additional preoperative investigation/ imaging which is usually not done	None	None	None	None	None	None	None	None
Any difficulty faced in the procurement of blood products: unavailability of donors/dearth of products from rare blood group	Unavailable blood group (1)	None	Unavailable donors (3), unavailable blood group (1)	None	None	None	None	None
<b>Anesthesia modifications</b>								
Type of anesthesia								
General	9	13	9	12	8	2	5	0
Regional	0	3	0	0	0	0	1	30
Local	0	8	2	7	0	0	2	0
Any change in anesthesia mode (example: regional used instead of general anesthesia)	No	No	No	No	No	No	Yes (1)	No
PPE used by anesthetists	33.33% (3)	8.3% (2)	90% (9)	41.6% (5)	25% (2)	0	83.3% (5)	0
Extubation on table	33.33% (3)	100% (13)	12.5% (1)	8.3% (1)	37.5% (3)	0	80% (4)	—
<b>Modifications during surgery</b>								
Use of PPE during the procedure	0	8.3% (2)	100% (11)	31.6% (6)	0	0	75% (6)	0
Difficulty in operating using PPE	44.44% (4)	100% (2)	91% (10)	14.3% (1)	—	—	—	—
Use of centralized air-conditioning	100% (8)	100% (24)	0	89.5% (17)	100% (8)	100% (2)	100% (8)	100% (31)
Use of separate unit of air-conditioner	0	12.5% (3)	0	0	0	100% (2)	87.5% (7)	0
<b>Technique of surgery</b>								
Open	9	13	11	19	8	2	8	28
Laparoscopic	0	2	0	0	0	0	0	0

(Contd...)

Table 2: (Contd...)

Preoperative preparation	Surgical gastroenterology (n = 9)	Urology (n = 24)	Neurosurgery (n = 11)	Endocrine surgery (n = 19)	Pediatric surgery (n = 8)	Cardiothoracic and vascular surgery (n = 2)	Plastic surgery (n = 8)	Maternal and reproductive health (n = 31)
Robotic	0	0	0	0	0	0	0	0
Endoscopic	0	9	0	0	0	0	0	0
Use of energy instrument: monopolar cautery/bipolar cautery/other energy devices/combination	9/9 (100%)	13/24 (54.2%)	9/11 (81.8%)	19/19 (100%)	8/8 (100%)	2/2 (100%)	8/8 (100%)	24/24 (100%)
Bowel surgery—stoma made (yes/no)—was it indicated in usual circumstances (yes/no)	55.55% (5)	0	0	0	12.5% (1)	0	0	0
Any patients who developed symptoms or complications due to COVID-19 in post-op	No	No	No	No	No	No	No	No
Number of cases with operating surgeons as resident/young consultant/senior consultant	9/9/0	(24/11/3)	(9/2/0)	(19/0/9)	8/8/0	2/2/0	8/8/0	27/27/0
Duration of procedure (median)	114 minutes	45 minutes	180 minutes	120 minutes	150 minutes	180 minutes	60 minutes	60 minutes
Total duration of postoperative hospital stay (median)	12 days	5 days	12 days	4 days	13 days	4 days	5 days	7 days
Any prolongation of hospital stay due to COVID-19 with reason	Difficulty in arranging for travel (1) and wound care (1)	No	Difficulty in arranging money (1) and non availability of a home suction machine (1)	No	No	No	No	No

(the COVID report was finally negative). Except for COVID testing, no additional investigation was performed by any department before surgery that would not be performed in non-COVID times. Two departments faced issues with arranging blood products. On two occasions; there were no donors available for replacement donation. One patient could not arrange a same-group donor for platelet donation (single-donor platelets) while the packed red cells of the same blood group (O-negative) were unavailable on two occasions.

As far as anesthesia is concerned, most of the departments continued their usual preference for the type of anesthesia. In

one patient with a hand injury operated by plastic surgeons, local anesthesia was used instead of regional or general anesthesia. Two departments reported the use of PPE by anesthetists on more than 50% of occasions: neurosurgery and plastic surgery. CVS as well as MRH reported no use of PPE by the anesthetists. In the latter, only regional anesthesia was used whereas cardiothoracic surgical procedures were carried out under general anesthesia. However, N95 respirators were used by every person inside the operating room. The practice of extubation of the patient on the operating table was according to the usual practice across all departments and no patient was offered any elective ventilation

for reasons other than the usual surgical indications. A transparent impermeable face shield was used during each episode of intubation and extubation.

The practice of the use of PPE by the operating surgeons mimicked that of the anesthetists. However, besides CVS and MRH, pediatric surgery was one department where the surgeons did not use PPE because they presumed that it would significantly hamper their ability to operate upon children. Urologists, neurosurgeons, and gastro surgeons reported significant problems during surgery with PPE. Constant fogging of goggles, perspiration, and restricted range of sight were the most important limitations reported. All the departments except neurosurgery had a centralized air-conditioning system with separate air-handling units. CVS and Plastic Surgery additionally had a separate unit of air-conditioning in the postoperative period. All the procedures performed across various specialties were by open technique except for nine cystoscopies for stent removal. No laparoscopy/robotic surgery was performed. Energy sources were used by all the surgeons and the most commonly used were monopolar and bipolar diathermy. A harmonic scalpel was sparingly used. The mean duration of surgery across various specialties ranged from 45 to 210 minutes. The intestinal stoma was preferentially fashioned in three cases of bowel surgery. The mean length of hospital stay for the specialties ranged from 4 to 13 days. This was not very different from that before the pandemic.

None of the patients developed any COVID-related symptoms in the postoperative period. Four patients out of the entire cohort had prolongation of hospital stay due to difficulty in procuring money for bill payment, difficulty in arranging for travel, and nonavailability of a home suctioning device, all due to the travel restrictions enforced by lockdown. During the 6-week study period and 2 weeks after that, none of the HCWs who came in contact with any of the 112 patients developed any COVID-related symptoms or tested positive.

## DISCUSSION

The nationwide lockdown in India in response to COVID-19 is a difficult situation for patients requiring surgery. Even though there was no check on the emergency procedures and cancer surgery, the actual number of cases that were operated on decreased remarkably as compared to a similar period in the previous year. The travel restrictions were an important cause for a decrease in footfall in the hospital.

In this study, we assessed the impact of COVID-19-related lockdown in the following areas: preoperative preparation, anesthesia-related concerns, surgery-related concerns, and impact on the delivery of surgical care.

### Preoperative Preparation

In the present study, we found that except for the screening of individual patients and their attendants for COVID by RT-PCR (reverse transcriptase—polymerase chain reaction), no other tests were performed. In February and March 2020, when the number of cases of COVID-19 was rising exponentially, there was a lot of confusion regarding how to proceed with surgery in patients who might be suspects and not proven cases of COVID-19. Since the sensitivity of existing tests was low, radiological tests, particularly a CT of the chest, received a lot of attention.<sup>8</sup> According to the Intercollegiate General Surgery Guidance on COVID-19 (March

27, 2020), a CT of the chest was recommended as an option for patients requiring emergency surgery who did not have COVID-19 testing. The Indian recommendations were also evolving at the same time. At our institute, other than a chest X-ray that is anyway done prior to surgery, no additional test was done. The testing capacity (RT-PCR) was judiciously utilized in the initial 10 days by screening only those patients who had symptoms similar to COVID, a history of travel to high incidence areas, or a history of contact. Later when the testing capacity was enhanced and the protocols were established, all patients undergoing surgery were subjected to a COVID test prior to surgery. Other than the COVID test, the only concern in the pre-operative period was the availability of blood products on a few occasions. The unavailability of replacement donors and group-specific donors was a direct consequence of the travel restrictions. Group-specific blood was not available at times due to the inability to arrange blood donation camps, especially for the rare blood groups.

### Anesthesia-related Concerns

The type of anesthesia did not differ much for the type of surgeries that were performed except for one case out of the entire study population. There was no inclination toward opting for regional instead of general anesthesia to prevent aerosol generation. Regional anesthesia was utilized extensively by the department of MRH as nearly all the cases performed were cesarean sections. Among the other departments, regional anesthesia was used only on four occasions. The practice of the use of PPE was not consistent and there was a heavy reliance on face shields and N95 respirators despite the compelling evidence that they may be insufficient to stop viral transmission in all cases.<sup>9</sup> It is for the first time in history that the use of PPE has been so extensive. The discomfort associated with PPE is well known, and now that they are being used more frequently, their effect on personnel fatigue will be better known in the coming weeks and months.<sup>10</sup> PPEs were sparingly used in the present study without any untoward consequences and this may highlight that the risk of transmission may not be worrisome for patients undergoing surgery who are COVID negative or those who have been adequately screened. However, if there is a reason to suspect a COVID-positive status, full protection with PPE is mandatory.

### Surgery-related Concerns

All patients underwent surgery by an open technique across various specialties except for nine in the Urology Department who underwent a cystoscopy. The prime reason for moving away from laparoscopy and robotic surgery was the risk of generation of aerosols during insufflation, extraction of the specimen, and deflation following the procedure. Despite growing evidence that there is a minimal risk of transmission with laparoscopy, apprehension among surgeons prevails.<sup>11</sup> At our institute, the surgeons preferred to avoid laparoscopy due to the lack of clarity on the actual risk of transmission. All the operating rooms had centralized air-conditioning and could not be customized before the lockdown period to have a separate unit of air-conditioning. However, the air-handling units for various departments were separate and only one table in each department remained active at a time. After every case, the theater was fumigated.

The use of PPE by the surgeons was not uniform. While the neurosurgeons donned in every case, the pediatric surgeons did

not use it at all. However, most of them reported significant trouble operating with the PPE. Similar issues with PPE have been reported previously that affect the dexterity and visibility of the surgeons but do not significantly affect the performance.<sup>12</sup> However, heat stress and eye fatigue may become limiting factors in a prolonged surgery. Standing for hours at a stretch may become intolerable particularly with non-ventilated PPEs as in our case. Even with ventilated suits, comfort changes dramatically with small changes in ambient temperature.<sup>12</sup>

As per the surgeons, the duration of surgery and length of hospital stay were not starkly different from the non-COVID times. In all the cases, young residents were part of the operating team. They were accompanied by young consultants in the majority of the cases except in Urology and Neurosurgery where they performed the surgery independently in more than 50% of cases.

### Impact of COVID on the Delivery of Surgical Care

Compared to a similar period exactly 1 year ago, there was a precipitous decline in the number of cases. Cardiothoracic and Vascular Surgery experienced the most significant fall, decreasing to 2% of the usual burden. Department of MRH was able to reach 46% of its usual caseload which was the highest among all departments. Few HCWs from every department were pooled into a COVID workforce, hence the reduction in nursing staff by 23–55% in different departments (Fig. 2). The specialties with a larger staff pool contributed more toward the COVID workforce. Relocation of a few staff members on rotation for COVID duty was not a deterrent to the usual hospital works due to a drastic fall in the overall caseload. In fact, as the workforce shrunk by about 30%, the caseload fell nearly by 90%, indicating that the existing workforce remained underutilized.

### CONCLUSION

The nationwide lockdown in India in response to COVID-19 pandemic has seriously affected the non-COVID super-specialty surgical case management. Though the testing protocols have evolved during this period and surgeries are being performed, most of the cases are still done by an open technique. The use of PPE by anesthetists as well as surgeons is not widespread and uniform across various specialities; the level of comfort is low reflecting the level of acceptance. Despite nearly one-third of HCWs being diverted toward the COVID facilities, the non-COVID surgical care has remained underutilized.

### ORCID

Rahul R  <https://orcid.org/0000-0001-7690-6704>

Sabaretnam Mayilvaganan  <https://orcid.org/0000-0002-2621-394X>

### REFERENCES

1. Sankar J, Dhoachak N, Kabra SK, et al. COVID-19 in children: clinical approach and management. *Indian J Pediatr* 2020;87(6):433–442. DOI: 10.1007/s12098-020-03292-1.
2. Ma S, Lai X, Chen Z, et al. Clinical characteristics of critically ill patients co-infected with SARS-CoV-2 and the influenza virus in Wuhan, China. *Int J Infect Dis* 2020;S1201-9712(20)30375-1. DOI: 10.1016/j.ijid.2020.05.068.
3. Li Q, Guan X, Wu P, et al. Early transmission dynamics in Wuhan, China, of novel coronavirus-infected pneumonia. *N Engl J Med* 2020;382(13):1199–1207. DOI: 10.1056/NEJMoa2001316.
4. Aminian A, Safari S, Rzehghian-jahromi A, et al. COVID-19 outbreak and surgical practice: unexpected fatality in perioperative period. *Ann Surg* 2020;272(1):e27. DOI: 10.1097/SLA.0000000000003925.
5. Cheeyandira A. The effects of COVID-19 pandemic on the provision of urgent surgery: a perspective from the USA. *J Surg Case Rep* 2020;2020(4):rjaa109. DOI: 10.1093/jscr/rjaa109.
6. Seethalakshmi S, Nandan R. Covid impact: 5.8 lakh elective surgeries postponed in India. *Livemint*, HT Media; May 18, 2020. Available from: [www.livemint.com/companies/news/covid-impact-5-8-lakh-elective-surgeries-postponed-in-india-11589797160393.html/](http://www.livemint.com/companies/news/covid-impact-5-8-lakh-elective-surgeries-postponed-in-india-11589797160393.html/).
7. Ke C, Gupta R, Xavier D, et al. Divergent trends in ischaemic heart disease and stroke mortality in India from 2000 to 2015: a nationally representative mortality study. *Lancet Glob Health* 2018;6(8):e914–e923. DOI: 10.1016/S2214-109X(18)30242-0.
8. He JL, Luo L, Luo ZD, et al. Diagnostic performance between CT and initial real-time RT-PCR for clinically suspected 2019 coronavirus disease (COVID-19) patients outside Wuhan, China. *Respir Med* 2020;168:105980. DOI: 10.1016/j.rmed.2020.105980.
9. Long Y, Hu T, Liu L, et al. Effectiveness of N95 respirators versus surgical masks against influenza: a systematic review and meta-analysis. *J Evid Based Med* 2020;13(2):93–101. DOI: 10.1111/jebm.12381.
10. Newill CA, Koegel AE, Prenger VL, et al. Utilization of personal protection equipment by laboratory personnel at a large medical research institution. *Appl Ind Hygiene* 1989;4(8):205–209. DOI: 10.1080/08828032.1989.10390433.
11. Vigneswaran Y, Prachand VN, Posner MC, et al. What is the appropriate use of laparoscopy over open procedures in the current COVID-19 climate? *J Gastrointest Surg* 2020;1–6. DOI: 10.1007/s11605-020-04592-9.
12. Loibner M, Hagauer S, Schwantzer G, et al. Limiting factors for wearing personal protective equipment (PPE) in a health care environment evaluated in a randomised study. *PLoS One* 2019;14(1):e0210775. DOI: 10.1371/journal.pone.0210775.