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Outcomes

What is the patient experience of surgical care during the coronavirus disease 2019 (COVID-19) pandemic? A mixed-methods study at a single institution



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ABSTRACT

Background: The coronavirus disease 2019 outbreak has spread worldwide and has resulted in hospital restrictions. The perceived impact of these practices on patients undergoing essential surgeries is less understood.

Methods: Adult (≥ 18 years) patients who underwent medically necessary surgical procedures spanning multiple surgical specialties from March 23, 2020, to April 24, 2020, during the coronavirus disease 2019 pandemic were identified as eligible for a phone survey. Survey responses were analyzed using a mixed-methods approach involving descriptive statistics and thematic analysis of coded and annotated survey results.

Results: Of the 212 patients who underwent medically necessary surgical procedures during the coronavirus disease 2019 pandemic, the majority of these patients were male (61.3%), White (83.5%), married or with a domestic partner (68.9%), and underwent oncologic procedures (69.3%). Of the 46 patients (21.7%) who completed the survey, the majority of these patients indicated that coronavirus disease 2019 pandemic restrictions had no impact on their inpatient hospital stay and were satisfied with their decision to proceed with surgery. Severity of patient condition (44.4%), the risk/benefit discussion with the surgeon (24.4%), and coronavirus disease 2019 education and testing (19.5%) were the most important factors in proceeding with surgery during the pandemic; 34.4% of patients said their inpatient post-operative course was negatively affected by the lack of visitors.

Conclusion: Medically necessary, time-sensitive surgical procedures, as determined by the surgeon, can be performed during a pandemic with good patient satisfaction provided there is an appropriate discussion between the surgeon and patient about the risks and benefits.

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Introduction

During December 2019, an outbreak of pneumonia and respiratory syndromes in Wuhan, Hubei Province, China resulted in the identification of a novel coronavirus, severe acute respiratory

syndrome (SARS)-CoV-2 or coronavirus disease 2019 (COVID-19).¹ Since December, there has been rapid expansion of the COVID-19 outbreak worldwide. The outbreak emerged in the United States on January 20, 2020, and the swift spread of the virus prompted the World Health Organization to declare it to be a global pandemic on March 11, 2020.^{2–4}

Given the necessity to minimize infection risk and to preserve resources for patients with COVID-19, US hospital systems resorted to canceling elective surgeries, mirroring surgical urgency schemas developed in other regions, including Lyon, France and the Lombardy region of Italy.^{5,6} On March 18, 2020, the Center for Medicare

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and Medicaid Services announced that all elective and nonessential procedures should be delayed, resulting in 33 states (66%) issuing individual guidance (ie, mandates or recommendations) regarding how to determine which procedures are considered essential.⁷ Although indications for emergency surgery during the pandemic have remained unchanged, there has been a question of how to define “elective” surgeries, as many of these procedures are necessary and time-sensitive without being urgent.^{8–10} Many surgical societies, principally the American College of Surgeons (ACS), have issued recommendations regarding prioritization of surgical procedures during the pandemic.^{11–13}

Although providers have assumed the responsibility of decision making for scheduling surgeries, some have questioned the psychologic impact that this may have on patients should their surgery be postponed.¹⁴ Some patients, particularly those with malignancies, may be more willing to pursue surgical procedures during a pandemic despite having up to a 5-fold increased risk of COVID-19 infection compared with patients without malignancies.¹⁵ Even so, a recent study of patients scheduled for endoscopic procedures in Italy found that a quarter of patients did not show up for their procedures, suggesting that the fear of COVID-19 infection outweighed the fear of undiagnosed or untreated disease.¹⁶ On the other hand, a recent study out of Chicago noted that 1 out of 5 patients, particularly those with more comorbidities, believed that the COVID-19 outbreak had little or no effect on their life.¹⁷ This suggests that healthcare providers may have a poor sense of patients' experiences of the pandemic as the impact of the pandemic on patients undergoing surgical procedures is not defined. This study seeks to identify patients undergoing essential surgical procedures during the pandemic and to investigate how these patients perceived their surgical experience as a result of the pandemic.

Methods

Study population selection

Adult (≥ 18 years) patients were included in the study following a retrospective analysis of all medically necessary surgical procedures performed at the Hospital of the University of Pennsylvania between March 23, 2020, and April 24, 2020. This time period was determined based on restriction start time and surgical resurgence time put in place by our institution. Included procedures were defined as procedures that were deemed medically necessary, despite being scheduled as “elective” within our institution's internal scheduling system, and where patients arrived in the preoperative area directly from home on the morning of surgery. The formal medically necessary, time-sensitive surgery (MeNTS) scoring system was not implemented at our institution until May 4, 2020, beyond the time period of this study; all patients within the study were classified as medically necessary at the discretion of the surgeon with oversight by department and division chairs.

Patients who underwent a procedure in which urology, obstetrics and gynecology, or breast oncology was the primary surgical service were excluded from inclusion in the study owing to a potential bias of patient sex. Additionally, patients who underwent minor procedures with nonsurgical specialties, including bronchoscopy, endoscopy, colonoscopy, laryngoscopy, and gastrostomy tube placement, were excluded from the study. Patients who were admitted directly from the emergency department before surgery were excluded from the study because these patients indicated emergency or urgent procedures. Patients who died during their admission period were excluded from the study ($N = 2$) because of the inability to survey these patients. Of note,

neither of these patients died for reasons related to COVID-19 infection.

Of those patients who were eligible for inclusion in the study, we retrospectively collected detailed data regarding patient demographics, preoperative information, operative characteristics, and postoperative characteristics from the medical records. Patient data were maintained in accordance with the Health Insurance Portability and Accountability Act. The study was deemed exempt from continuing review by the Institutional Review Board of the University of Pennsylvania (protocol #842962). Descriptive analyses were performed to demonstrate the patient, preoperative, admission, and postoperative characteristics of the patients. Quantitative statistical analyses were conducted with Stata for Windows, version 13.1.¹⁸

Survey design

We developed a survey to address patient perceptions of the impact of the COVID-19 pandemic on their experience undergoing surgical procedures during a time period in which institution restrictions were in place. Specifically, we investigated patients' perceptions regarding their preoperative, day of surgery, and postoperative experiences with their healthcare team. We additionally inquired as to whether patients had been tested for COVID-19 or had developed symptoms of COVID-19 at any point during their admission or postoperative period. Beginning on April 14, 2020, the Hospital of the University of Pennsylvania began a pilot perioperative testing program in which all elective surgeries required testing for COVID-19 within 48 hours before proceeding; this resulted in some patients within our population being tested before their surgical procedure.

The survey and informed consent (Supplementary Fig S1) provided by phone were deemed exempt from approval by the University of Pennsylvania Institutional Review Board. Informed consent was provided at the start of the phone conversation, and patients who elected to not consent were not included within the survey analyses. The phone survey was administered within a minimum of 2 weeks after the date of the surgical procedure to patients who were deemed eligible, and 2 attempts were made to contact patients for survey completion.

Using a cross-sectional study design, we developed a survey that was based on published recommendations for survey design and was delivered by phone. The survey included 5 yes or no, 6 multiple choice, 8 Likert scale, and 6 open-field questions; we were unable to use a validated survey metric given the novelty of COVID-19. Each eligible patient was assigned a unique identification number at the time of accrual; this unique number was linked to their responses upon completion of the survey. All responses were kept confidential and anonymous. Discussions regarding risks and benefits related to surgery and COVID-19 were included as part of the surgical consent and were left to the discretion of the surgical team.

Qualitative analysis

Qualitative analysis for the study was managed with NVivo 12 (QSR International) and used a content analysis approach.¹⁹ Responses to open-ended survey questions were annotated individually by authors ABS, JTC, and CV to derive thematic categories. Themes were compiled and used to develop a codebook—a formal thematic taxonomy—composed of a combination of categories derived from the structure of the questionnaire and categories emergent in respondents' discourse. This codebook was used by authors C.V. and M.K. to double code a randomly selected subset of responses (40% of the data). The codebook was refined by revising

Table 1

Baseline patient characteristics of all patients undergoing surgical procedures during the COVID-19 pandemic at a single institution and patients who elected to participate in the study survey

	All patients N = 212 (%)	Survey patients N = 45 (21.2%)		All patients N (%)	Survey patients N (%)
Age			Comorbidities		
18–29 years	10 (4.7)	0 (0.0)	Prior stroke	10 (4.7)	2 (4.4)
30–39 years	17 (8.0)	6 (13.3)	Coronary artery disease	40 (18.9)	7 (15.6)
40–49 years	23 (10.9)	9 (20.0)	Hypertension	113 (53.3)	20 (44.4)
50–59 years	48 (22.6)	11 (24.4)	Cardiac valve disease	21 (9.9)	5 (11.1)
60–69 years	65 (30.7)	12 (26.7)	Cardiac arrhythmia	32 (15.1)	6 (13.3)
70–79 years	44 (20.8)	7 (15.6)	Congestive heart failure	18 (8.5)	4 (8.9)
≥80 years	5 (2.4)	0 (0.0)	Prior myocardial infarction	17 (8.0)	4 (8.9)
Sex			Prior coronary stent	22 (10.4)	6 (13.3)
Male	130 (61.3)	27 (60.0)	Peripheral artery disease	19 (9.0)	7 (15.6)
Female	82 (38.7)	18 (40.0)	History of COPD	9 (4.3)	1 (2.2)
Race			History of cirrhosis	2 (0.9)	0 (0.0)
White	177 (83.5)	35 (77.8)	History of ascites	2 (0.9)	0 (0.0)
Black	19 (9.0)	7 (15.6)	Diabetes mellitus		
Asian	5 (2.4)	1 (2.2)	None	176 (83.0)	41 (91.1)
Hispanic	5 (2.4)	1 (2.2)	Insulin-dependent	16 (7.6)	1 (2.2)
Other/unknown	6 (2.8)	1 (2.2)	Non-insulin dependent	20 (9.4)	3 (6.7)
Marital status			Chronic kidney disease	17 (8.0)	2 (4.4)
Single	41 (19.3)	7 (15.6)	Preoperative dialysis	3 (1.4)	0 (0.0)
Married or domestic partner	146 (68.9)	34 (75.6)	History of DVT/PE	28 (13.2)	7 (15.6)
Divorced or separated	15 (7.1)	2 (4.4)	Chronic steroid use	13 (6.1)	1 (2.2)
Widowed	10 (4.7)	2 (4.4)	History of smoking	105 (49.5)	21 (46.7)
Insurance status			Obesity (BMI ≥30 kg/m ²)	93 (43.9)	22 (48.9)
No insurance	0 (0.0)	0 (0.0)	ASA classification		
Private	133 (62.7)	35 (77.8)	1	0 (0.0)	0 (0.0)
Medicare	71 (33.5)	9 (20.0)	2	73 (34.4)	18 (40.0)
Medicaid	6 (2.8)	0 (0.0)	3	16 (54.7)	19 (42.2)
Government	2 (0.9)	1 (2.2)	4	23 (10.9)	8 (17.8)

ASA, American Society of Anesthesiologists; BMI, body mass index; COPD, chronic obstructive pulmonary disease; COVID-19, coronavirus disease 2019; DVT, deep venous thrombosis; PE, pulmonary embolus.

vague categories, introducing new ones to characterize previously missing themes, and eliminating classifications that were shown to lack utility. Coding was compared between coders to reconcile discrepancies through discussion and consensus. The remaining data were double coded by C.V. and M.K. using the second iteration of the codebook. After this second round of coding it was determined that the codebook needed no further adjustments. Coding was again compared to reconcile any discrepancies between coders.

Results

Patient and clinical characteristics of surgical patients

The final study population included 212 patients with a median age of 61 (interquartile range [IQR] 42.5–79.5) years and 38.7% female patients (Table 1). The majority of all patients who underwent surgery during the study period were White race (83.5%), were married or with a domestic partner (68.9%), and had private insurance (62.7%). Additionally, when examining the comorbidities of this population, the majority of patients had an American Society of Anesthesiology classification of 3 (54.7%). The majority of the procedures performed during the study period were oncologic (69.3%), distributed among the gastrointestinal (13.7%), colorectal (13.7%), oncologic (18.4%), thoracic (16.5%), and otolaryngology (11.3%) services (Table II). Almost all patients were discharged to home or home with home health services; 1 patient required discharge to acute rehabilitation. Although almost all patients were seen in the clinic for their preoperative history and physical visit, 24.1% of patients had no postoperative follow-up (ie, in-person, telemedicine, and telephone) with their surgical team.

Survey responses

Out of 212 eligible patients, 46 patients (21.7%) completed the phone survey. Patient characteristics in the survey group were similar to those within the overall study population based on descriptive analyses. Of the 46 patients, 2 (4.3%) patients indicated their surgical date had been rescheduled because of the implementation of COVID-19 pandemic restrictions. All patients indicated being asked about COVID-19 signs and symptoms on the day of surgery. During the preoperative period, 41 (89.1%) patients indicated that the risks and benefits of proceeding with their medically necessary procedure during a pandemic were explained to them by someone from their surgical team (ie, the surgeon or another outpatient provider). After this discussion, 6 (13%) patients considered not proceeding with their procedure, despite ultimately proceeding. Overall, the majority of patients ($N = 44$, 95.7%) were satisfied or very satisfied with their decision to proceed with surgery based on mean and median Likert scores (mean 4.6, standard deviation [SD] 0.9; median 5, IQR 1).

Patients reported feeling generally satisfied with the risk/benefit discussion with their surgical provider team (Fig 1), with mean and median Likert score of 4.5 (standard deviation [SD] 1.0) and 5 (interquartile range [IQR] 1), respectively. However, patients were relatively uncomfortable with the inability to have family or friends accompany them on their day of surgery (mean 2.7, SD 1.1; median 3, IQR 1), with 18 (39%) patients indicating some level of discomfort. On the day of surgery, the majority of patients reported that the COVID-19 pandemic restrictions had no impact on their recovery area (ie, postanesthesia care unit) care (mean 3.2, SD 0.6; median 3, IQR 0) or inpatient stay experience (mean 3.0, SD 0.8; median 3, IQR 0). After surgery, 27 (58.7%) patients indicated that they lived with another person who met the CDC criteria for a high-risk individual; unfortunately, 6 (13%) patients had no one at home

Table II

Preoperative, clinical, and postoperative characteristics of all patients undergoing surgical procedures during the COVID-19 pandemic at a single institution and patients who elected to participate in the study survey

Preoperative and clinical characteristics	All patients N (%)	Survey patients N (%)	Postoperative characteristics	All patients N (%)	Survey patients N (%)
History and physical provider visit			Admission	165 (77.8)	32 (71.1)
None	1 (0.5)	1 (2.2)	Length of stay (<i>mean, SD</i>)	3.2 (2.9)	3.2 (3.1)
Clinic	199 (93.9)	43 (95.6)	Intensive care unit requirement	35 (16.5)	9 (20.0)
Telemedicine	11 (5.2)	1 (2.2)	Ventilated \geq 48 hours	4 (1.9)	2 (4.4)
Telephone	1 (0.5)	0 (0.0)	Continuous renal replacement	1 (0.5)	0 (0.0)
Hemoglobin (<i>median, IQR</i>)	13.7 (11.6–15.8)	13.6 (10.9–16.3)	Transfusion requirement	29 (13.7)	8 (17.8)
Hypoalbuminemia	4 (1.9)	1 (2.2)	Total parenteral nutrition	2 (0.9)	1 (2.2)
Unknown	127 (59.9)	29 (64.4)	Reoperation required	5 (2.4)	1 (2.2)
White blood cell count			Morbidity		
Normal	96 (45.3)	21 (46.7)	Wound infection	10 (4.7)	3 (6.7)
Leukopenia	7 (3.3)	0 (0.0)	Percutaneous abscess drainage	4 (1.9)	2 (4.4)
Leukocytosis	4 (1.9)	0 (0.0)	Sepsis or septic shock	1 (0.5)	1 (2.2)
Unknown	105 (49.5)	24 (53.3)	Pneumonia	7 (3.3)	1 (2.2)
Thrombocytopenia	12 (5.7)	2 (4.4)	Acute kidney injury	8 (3.8)	2 (4.4)
Unknown	105 (49.5)	24 (53.3)	Myocardial infarction	1 (0.5)	0 (0.0)
Oncologic procedure	147 (69.3)	29 (64.4)	Cardiac arrest	1 (0.5)	0 (0.0)
Surgical specialty			Stroke	0 (0.0)	0 (0.0)
Gastrointestinal	29 (13.7)	6 (13.3)	Deep venous thrombosis	2 (0.9)	0 (0.0)
Colorectal	29 (13.7)	6 (13.3)	Pulmonary embolus	1 (0.5)	0 (0.0)
Oncologic	39 (18.4)	8 (17.8)	Discharge location		
Thoracic	35 (16.5)	6 (13.3)	Home	154 (72.6)	34 (75.6)
Vascular	7 (3.3)	0 (0.0)	Home with home services	57 (26.9)	11 (24.4)
Plastic surgery	10 (4.7)	4 (8.9)	Acute rehabilitation	1 (0.5)	0 (0.0)
Otolaryngology	24 (11.3)	5 (11.1)	Postoperative follow-up		
Cardiac	23 (10.9)	8 (17.8)	None	51 (24.1)	11 (24.4)
Neurosurgery	8 (3.8)	1 (2.2)	Clinic	29 (13.7)	4 (8.9)
Orthopedic and foot	8 (3.8)	1 (2.2)	Telemedicine	35 (16.5)	8 (17.8)
Anesthesia type			Telephone	15 (7.1)	4 (8.9)
General	206 (97.2)	44 (97.8)	Follow-up NOS	82 (38.7)	18 (40.0)
Monitored anesthesia care	5 (2.4)	1 (2.2)			
Local anesthetic	1 (0.5)	0 (0.0)			

COVID-19, coronavirus disease 2019; IQR, interquartile range; SD, standard deviation; NOS, not otherwise specified.

to help them after surgery, and 2 (4.3%) patients were unable to obtain the necessary supplies or medications that they needed at home. Despite this, the majority of patients ($N = 44$, 95.7%) were either satisfied or very satisfied with their postoperative care and follow-up (mean 4.5, SD 0.9; median 5, IQR 1), and 37 patients (82.2%) were either satisfied or very satisfied with their ability to safely go home (mean 4.2, SD 1.1; median 5, IQR 1).

On April 8, 2020, our institution implemented a pilot program to test patients for COVID-19 within 48 hours before their scheduled, medically necessary surgical procedure; 21 (45.7%) of patients indicated being tested before surgery and knowing their results. None of the patients who completed the survey after their surgical procedure had a positive COVID-19 test. Five (10.9%) patients had COVID-19 symptoms postoperatively; of these patients, 2 patients reported being tested with negative results for COVID-19. Three of these symptomatic patients reported not being tested for COVID-19. To the authors' knowledge, no patients who met inclusion criteria for the study contracted COVID-19 within the perioperative period.

Open-ended question responses to patient survey

The 6 open-ended survey questions included in the phone survey were subjected to content analysis and are presented in Table III. Regarding satisfaction with the risk/benefit discussion with the surgical team, 17 (41.5%) patients expressed a degree of expectation that this conversation should occur given the risks of COVID-19, and 15 (36.6%) patients said that the discussion assuaged their anxieties. Despite this, many participants expressed that this conversation would have not changed their decision to proceed with surgery because of the severity of the problem for which they

underwent the surgical procedure ($N = 8$, 19.5%). The importance of balancing the need for surgical intervention and the risk of COVID-19 ($N = 14$, 34.1%) and providing COVID-19 education to patients ($N = 8$, 19.5%) were additional relevant themes. A large portion of patients indicated that the severity of their condition ($N = 20$, 44.4%) and the importance of the risk/benefit discussion that they had with their provider ($N = 11$, 24.4%) were the reasons they decided to proceed with surgery. Of note, a minority of patients ($N = 7$, 15.6%) indicated that they were not concerned about COVID-19, so the risk of infection did not impact their decision.

When patients were asked about how comfortable they were with not being able to have visitors accompany them during their perioperative stay, 7 (15.2%) patients expressed negative feelings, including loneliness and fear and that they would miss instructions regarding their care. Even so, a portion of patients expressed their understanding for the restrictions ($N = 4$, 8.7%), and the majority of patients (25, 54.3%) said that the absence of visitors had no impact on their overall experience. Regarding both the recovery and inpatient experience, the majority of patients expressed that they were either content with their care or that the care they received was normal despite the pandemic restrictions.

Patients were asked about their overall satisfaction level with the decision to proceed with surgery, and the majority of patients ($N = 24$, 52.2%) indicated that they were satisfied because they were able to get the surgery done. Additionally, 10 patients (21.7%) indicated their satisfaction to "fix it" and return to the normalcy of their lives. A cohort of surveyed patients indicated a sense of gratitude ($N = 16$, 34.8%) in having the opportunity to receive their surgeries given the restrictions at our institution and the cancellations of medically necessary surgeries at institutions elsewhere in the country.

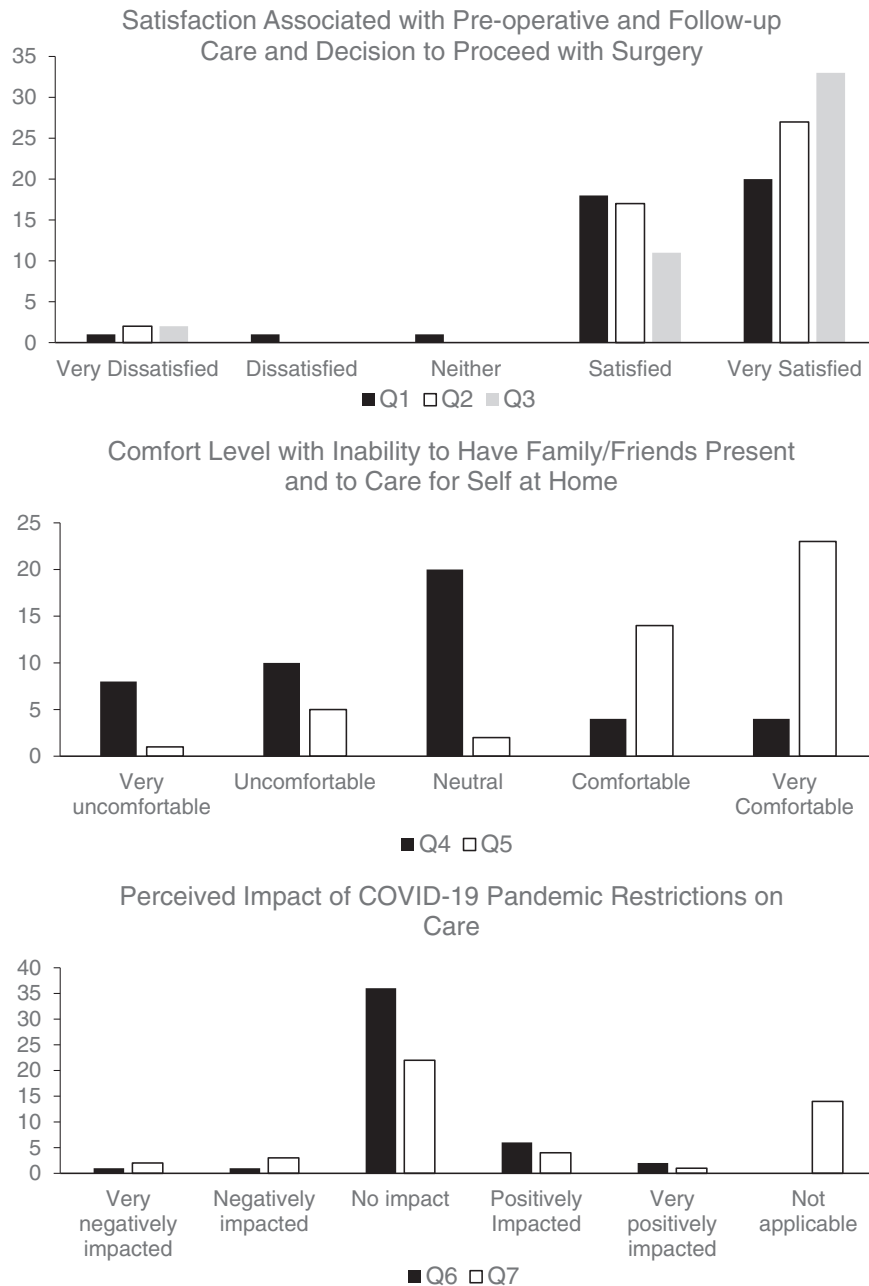


Fig 1. Patient responses to Likert scale questions regarding satisfaction, comfort, and perceived impact of restrictions during the COVID-19 on their perioperative experience. COVID-19, coronavirus disease 2019; SARS-CoV-2, severe acute respiratory syndrome.

- Q1: How satisfied were you with the discussion you had with your provider before surgery regarding the risks of having surgery during the SARS-CoV-2/COVID-19 pandemic?
 Q2: How satisfied were you with your postoperative care and follow-up after you were discharged from the hospital?
 Q3: How satisfied are you with your decision to pursue surgical care during the SARS-CoV-2/COVID-19 pandemic?
 Q4: How did you feel that you were not allowed to have family, friends, etc accompany you into the hospital before surgery?
 Q5: How did you feel about your ability to safely go home given the care and information you were provided?
 Q6: During your time in the recovery area (the postanesthesia care unit, or PACU), how do you feel the restrictions put in place for the SARS-CoV-2/COVID-19 may have impacted your care?
 Q7: If you were hospitalized following surgery, how do you feel the restrictions put in place for the SARS-CoV-2/COVID-19 may have impacted your hospital care?

Discussion

After the initial identification of the COVID-19 outbreak in December 2019, medical providers observed a worldwide spread of the virus that has led to significant changes in daily operations. Implementation of protocols to identify medically necessary procedures have been widely put into place to prioritize surgeries, balance the risk of infection to the provider and patient, and

preserve scarce resources necessary for hospital surges of infected patients.^{5–13} Although studies to date have investigated patients who contracted COVID-19 after undergoing surgery and have examined the impact of the pandemic's response and restrictions on healthcare providers, none, to the knowledge of the authors, have examined the perceived impact of the pandemic's restrictions on patients undergoing essential, elective surgical procedures.²⁰ Within a 5-week period in which our institution had restrictions

Table III

Coded themes and illustrative interviewee quotes from a survey administered to patients who underwent elective surgical procedures at the Hospital of the University of Pennsylvania during the 2020 COVID-19 pandemic restrictions period (46 patients participated in the phone survey)

<i>What led you to be dissatisfied or satisfied with the discussion regarding risks of surgery during the pandemic?</i>	
Theme*	Illustrative quotes
3.11 Balancing of concerns N = 14 (34.1%)	<i>Patients balanced their risks regarding their health status with the risks of COVID.</i> "We discussed how my heart condition increases my risk for infections but also that benefits of my surgery likely were more than the COVID risk."
3.12 Expectation of conversation N = 17 (41.5%)	<i>Patients felt the conversation was unnecessary, but some patients felt thankful to have had the conversation.</i> "I expected the conversation but it wasn't going to change anything anyway so it felt unnecessary you know?"
3.13 COVID-19 education N = 8 (19.5%)	<i>Patients noted the conversation helped them understand COVID-19's risks and/or helped them understand the way the hospital planned to take precautions.</i> "I think it was helpful to get a realistic idea of the risk COVID posed to me."
3.14 Providers reduced concerns N = 15 (36.6%)	<i>Patients mentioned the conversation with the surgeon helped reduce anxieties regarding their condition or the pandemic.</i> "I was really nervous because if I had a sick lung I didn't know if I should get a lung surgery during a lung disease, but the staff really helped calm me down."
3.15 Severity of condition N = 8 (19.5%)	<i>Patients noted their specific health condition as playing a role in their desire to have the surgical procedure.</i> "We discussed that I needed this done sooner rather than later."
<i>What caused you decide to proceed with surgery?</i>	
Theme†	Illustrative Quotes
3.21 To avoid postponement N = 10 (22.2%)	<i>Patients were worried about their surgery being postponed either because of trends in the news (ie, hospitals cancelling all surgeries) or their own lack of accountability.</i> "My surgery was explained as essential so I was nervous that you all like other places would stop surgeries, so I wanted to get it done ASAP before you did that."
3.22 Lack of COVID-19 concern N = 7 (15.6%)	<i>Patients did not believe the virus posed a significant threat either due to their personal health status or a lack of overall concern about the disease.</i> "I needed the heart surgery, there wasn't a doubt in my mind. The virus doesn't scare me."
3.23 Severity of condition N = 20 (44.4%)	<i>Patient's current condition was too pressing to wait on a procedure.</i> "I heard in the news about places pausing cancer surgeries and I wasn't going to let that happen to me."
3.24 Surgeon's opinion N = 4 (8.9%)	<i>Patients placed heavy weight on the opinion of their surgeon and acted in accordance with his or her recommendation.</i> "My main concern was that it was a lung surgery and COVID is a lung disease, but I figured that my doctor felt this was necessary."
3.25 Weight of risk/benefit discussion N = 11 (24.4%)	<i>Patients placed heavy weight on the risks and benefits conversation they had with their surgeon in influencing their decision.</i> "That conversation with my surgeon."
<i>What about not having anyone to accompany you on the day of surgery made you feel comfortable or uncomfortable?</i>	
Theme	Illustrative Quotes
3.31 Concern about lack of visitors N = 7 (15.2%)	<i>Patients voiced their concerns with the no visitor policy, such as loneliness, inability to absorb medical information, or a lack of advocacy.</i> "I'm not from [here] so I get bad phone signal so I couldn't call or video chat with anyone and I was lonely and scared I would forget some important information I was told."
3.32 No impact N = 25 (54.3%)	<i>Patients were not bothered by the regulations due either to the characteristics of their particular procedure or the fact that they most likely would have come alone anyway.</i> "I wouldn't have brought anyone anyway."
3.33 Enjoyed no visitors N = 3 (6.5%)	<i>Patients seemed to enjoy the fact that no visitors were allowed to accompany them.</i> "I got rest! I didn't have to entertain anyone!"
3.34 Recognized as necessary N = 4 (8.7%)	<i>Patients voiced their understanding for the necessity of the restrictions put into place, whether they were happy with them or not.</i> "Nobody there with you after, no support, lonely, but I get why it is necessary."
<i>What about your recovery area care made you feel this way?</i>	
Theme	Illustrative Quotes
3.41 Incapacitated N = 17 (37%)	<i>Patients did not have any memorable opinion of the recovery area, due to attentiveness of the nurses, the smaller number of patients, etc.</i> "I was just sleeping."
3.42 Masks prevalent N = 4 (8.7%)	<i>Patients mentioning the hospital staff wearing masks.</i> "It all just felt very alien. Like people were distant."
3.43 Normalcy N = 14 (30.4%)	<i>Patients mentioned that the recovery area did not feel any different despite the restrictions of the pandemic.</i> "They had on masks but otherwise it felt business as usual."
3.44 Pleased with care N = 13 (28.3%)	<i>Patients were pleased with the care that they received in the recovery area, due to attentiveness of nurses or the smaller patient number.</i> "I found everyone to be super attentive honestly. I don't know maybe that's their normal but it was great."
<i>What about your hospital care made you feel this way?</i>	
Theme‡	Illustrative Quotes
3.51 Content with care N = 13 (40.6%)	<i>Patients were very satisfied with the level of care they received during their stay.</i> "I don't know, I guess it is counterintuitive but everyone seemed so attentive. Maybe you all had less people? But it felt great."
3.52 Facilities N = 9 (28.1%)	<i>Patients had a positive or negative opinion regarding the organization and preparedness of the hospital and staff.</i> "Everyone felt very prepared and organized."
3.53 Lack of visitors N = 11 (34.4%)	<i>Patients mentioned the no-visitor restrictions having an impact on their hospital stay.</i> "What are you supposed to do all day without a visitor?"

(continued on next page)

Table III (continued)

What about your hospital care made you feel this way?	
Theme [‡]	Illustrative Quotes
3.54 Masks N = 2 (6.3%)	<i>Patients mentioning the hospital staff wearing masks.</i>
3.55 Normalcy N = 12 (37.5%)	<i>"I was anxious about all of the masks, but I don't think my actual care was affected." Patients mentioned that their hospital care did not feel any different despite the restrictions of the pandemic. "It felt like a normal hospital stay."</i>
If you were satisfied or dissatisfied with your decision, what led you to feel this way?	
Theme	Illustrative Quotes
3.61 Surgery is behind me N = 24 (52.2%)	<i>Patient was satisfied they went through with the surgery because it was "behind them" or "done and over with." "I'm just glad to finally have this all done."</i>
3.62 Dissatisfied with decision N = 5 (10.9%)	<i>Patient was unhappy with some aspect of the care they received at the hospital. "I mean, I guess I'm very satisfied because I got the surgery done but seriously these restrictions are absurd. COVID isn't a real issue."</i>
3.63 Facilities N = 12 (26.1%)	<i>Patients had a positive or negative opinion regarding the organization and preparedness of the hospital and staff. "I was impressed with how you all were able to make huge changes to a system in such short time."</i>
3.64 Fix-It Mentality N = 10 (21.7%)	<i>Patients mentioned being satisfied they went through with the surgery because it restored a sense of normalcy to them or surgery was a long-awaited fix. "Finally getting the treatment I needed, get the cancer behind me, I can get back to work."</i>
3.65 Gratitude N = 16 (34.8%)	<i>Patients were thankful that their surgery was not delayed, and thankful for the precautions taken and level of care provided to them. "It was just something that was so unknown and concerning but it was so impressive to see how organized you all were/I am so thankful my treatment wasn't delayed, and I felt that you all cared about me. I am so grateful."</i>
3.66 No concern for COVID-19 N = 3 (6.5%)	<i>Patients mentioned their lack of concern regarding COVID-19 or felt the restrictions and changes to care were unnecessary. "I really did not understand the gravity of COVID. I was so concerned about my disease so COVID was just background stuff."</i>

COVID-19, coronavirus disease 2019.

* Out of 46 patients, 41 answered this question.

† Out of 46 patients, 45 answered this question.

‡ Out of 46 patients, 32 were admitted to the hospital and were eligible to answer this question.

in place regarding surgical procedures, we identified patients who underwent medically necessary procedures and surveyed them regarding the perceived impact of these restrictions on their surgical experience.

In this study, we identified that most patients who underwent surgical intervention had an in-person, preoperative clinic visit 30 days before the date of surgery, despite clinical restrictions, but this was not mirrored in postoperative follow-up. A sizeable proportion (16.5%) of patients received follow-up by telemedicine methods after surgery. This transition toward telemedicine is in accordance with recommendations that healthcare providers and global health organizations should adopt telemedicine communication services in place of in-person visits during pandemic restrictions, particularly among high-risk patients, including surgical patients.^{21–24} As the Centers of Medicaid and Medicare services have expanded coverage for telehealth coverage during the pandemic, this aspect of healthcare access will likely become a more permanent fixture in healthcare.²⁴

Overall, the majority of patients were satisfied with their decision to proceed with surgery during the pandemic and its associated restrictions. Even those with dissatisfied comments during the survey still felt overall satisfied, and some even expressed gratitude because of the ability to get the procedure done at our institution despite large-scale elective surgery cancellations elsewhere. Dissatisfaction among patients was highest in regard to the inability to be allowed family or friends in the hospital at the time of surgery; patients who expressed dissatisfaction with their hospital stay cited this as the most important factor. A large portion of the patients surveyed indicated that their decision to proceed with the surgery was because of the severity of their condition, which is expected given that the COVID-19 restrictions emphasized medically necessary procedures. Overall, patients primarily expressed satisfaction with their care and the decision to proceed with surgery.

Although, to the authors' knowledge, none of the patients within this study had COVID-19, 3 weeks into the study period, our institution implemented preoperative COVID-19 testing for all

scheduled surgical procedures, similar to practices put in place for labor and delivery units in New York City.²⁵ Patients expressed reassurance during the survey regarding the ability to be tested preoperatively, despite none testing positive for COVID-19. Recent studies suggest that patients who believe they are at risk of developing COVID-19 have lower emotional well-being and sense of control, resulting in a worse patient experience.²⁶ Additionally, it is important to note that surgical patients with perioperative COVID-19 had increased 30-day mortality and morbidity rates, highest among men, patients age 70 or older, and those undergoing emergency or major surgeries.²⁷ These findings reinforce the importance of preoperative testing of patients for COVID-19 undergoing medically necessary surgical procedures to optimize patient outcomes and well-being. Our survey findings suggest that preoperative testing of patients for COVID-19 allows providers to control transmission of the virus but also positively impacts patient surgical experience and recovery due to perceived peace of mind.

This study has notable limitations; the study occurred at a single institution within a metropolitan city with a large surgical census, so the patient census during this time period and patient perceptions may not be generalizable to other institutions or regional centers. The survey methodology was inherently biased due to response bias and recall bias. We surveyed patients 2–4 weeks after their procedures to attempt to mitigate the impact of recall bias. We had an adequate response rate in this survey with >20% of the patient census during this time period responding to the survey. The individuals who responded to this survey may have particular experiences (either favorable or unfavorable) that differ from the greater population, potentially limiting their representativeness. Additionally, our survey respondents, though their descriptive profile appears representative of greater surgical patient populations, may have representative bias when compared to our larger study population and a larger overall surgical patient population. Finally, this study only represented the perspectives of patients who elected to undergo medically necessary surgical procedures during the COVID-19 pandemic; we did not use a referent group from outside of the pandemic due to inability to

properly survey such a group similarly to a COVID-19 cohort. Use of a referent surveyed group could have allowed comparison of patient reports during the pandemic restrictions to baseline perceptions at a single institution.

Despite these limitations, our study offers important insight into patient perceptions of their surgical experience during the COVID-19 pandemic. Of note, as our institutional census of COVID-19 has decreased, our hospital policy has permitted restricted visitation for patients undergoing surgical procedures, a factor that was deemed particularly important for patients based on survey findings. Preoperative testing for COVID-19 continues to be routine for all patients undergoing surgical procedures at our institution. As pandemic restrictions and MeNTS scoring are enforced and lifted at other institutions, it is important to understand how these restrictions and infrastructure changes impact surgical patients. Overall, patients were satisfied with their decision to proceed with surgery, but clinicians should recognize the importance of COVID-19 education and testing and appropriate risk/benefit discussions for their patients. Continued reassessment of patients' experiences will be important moving forward to ensure continued safety for patients while optimizing the surgical and recovery process.

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Conflict of interest/Disclosure

The authors have no relevant disclosures.

Supplementary materials

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