



# The Perioperative Patient Experience During COVID-19

The American Surgeon  
2022, Vol. 88(3) 498–506  
© The Author(s) 2021  
Article reuse guidelines:  
[sagepub.com/journals-permissions](https://sagepub.com/journals-permissions)  
DOI: 10.1177/00031348211061100  
[journals.sagepub.com/home/asu](https://journals.sagepub.com/home/asu)  


Andrew T. Dippre, BS , Kristen M. Quinn, MD, Melinda Walto, BSN, Rupak Mukherjee, PhD, Prabhakar K. Baliga, MD, and Andrea M. Abbott, MD, MSCR

## Abstract

**Background:** Access to elective surgical procedures has been impacted by the COVID-19 pandemic.

**Methods:** We sought to understand the patient experience by developing and distributing an anonymous online survey to those who underwent non-emergency surgery at a large academic tertiary medical center between March and October 2020.

**Results:** The survey was completed by 184 patients; the majority were white (84%), female (74.6%), and ranged from 18 to 88 years old. Patients were likely unaware of case delay as only 23.6% reported a delay, 82% of which agreed with that decision. Conversely, 44% felt that the delay negatively impacted their quality of life. Overall, 82.7% of patients indicated high satisfaction with their care. African American patients more often indicated a “neutral” vs “satisfactory” hospital experience ( $P < .05$ ) and considered postponing their surgery ( $P < .01$ ). Interestingly, younger patients ( $<60$ ) were more likely than older ( $\geq 60$ ) patients to note anxiety associated with having surgery during the pandemic ( $P < .01$ ), feeling unprepared for discharge ( $P < .02$ ), not being allowed visitors ( $P < .02$ ), and learning about the spread of COVID-19 from health care providers ( $P < .02$ ).

**Discussion:** These results suggest that patients are resilient and accepting of changes to health care delivery during the current pandemic; however, certain patient populations may have higher levels of anxiety which could be addressed by their care provider. These findings can help inform and guide ongoing and future health care delivery adaptations in response to care disruptions.

## Keywords

other, special topics, general surgery, COVID-19, surgical quality

## Key Takeaways

- Patients are resilient and accepting of changes to health care delivery during times of crisis.
- Patients less than 60 years old reported increased anxiety compared to older patients regarding perioperative preparedness and policy changes due to COVID-19.

## Introduction

During the initial COVID-19 response, the health care system underwent rapid and novel changes. Changes in policy were motivated to safeguard patients and maintain emergency response capability and adequate medical workforce and materials, thus access to surgical care and staff was intentionally limited during hospitalization.<sup>1</sup> The cancellation of “non-essential” procedures was

implemented in preparation for COVID-19 case surges as health care systems sought to prepare for the potential conversion of operating rooms to negative pressure rooms.<sup>2,3</sup> Many hospitals developed new criteria for life-saving or life-altering procedures and prioritization schema were developed to guide treatment for oncology patients to ensure health care systems could meet surge capacity.<sup>1,4,5</sup> Broadly, these efforts not only altered the case load of surgical departments but may have also

---

Department of Surgery, Medical University of South Carolina, Charleston, SC, USA

### Corresponding Author:

Andrea M. Abbott, MD, MSCR, Department of Surgery, Medical University of South Carolina, 96 Jonathan Lucas Street, Charleston, 29425 SC USA.  
Email: [abbottan@musc.edu](mailto:abbottan@musc.edu)

impacted patient acuity for non-COVID-19-related illness during the initial response to the COVID-19 pandemic. In addition to decreasing the number of surgical cases and procedures performed, hospital systems initiated safety protocols to prevent the spread of COVID-19 among healthy patients seeking routine care. Changes included adoption of health care delivery through online platforms, limitations in visitors to the hospital, universal masking, and compulsory COVID testing and screening. Such efforts were undertaken to preserve PPE, maximize the safety of admitted patients, and reduce health system overhead expenses.<sup>1,6</sup> This led to changes in how patients were evaluated for surgery, in some cases patients may have not met with their surgeons face-to-face until they were in the preoperative holding unit. Conversations regarding the risks and benefits of surgery and postoperative course were conducted via telephone, online platform, or on the day of surgery as opposed to an office setting with loved ones present and with time allowed for questions. While deemed necessary to limit the potential spread of COVID-19, the impact of these adaptations to the threat of the virus on the patient-physician relationship and the ability to develop rapport and trust between patient and physician prior to surgery are unknown.

Mental health is an important component of overall health and surgical outcomes can be greatly influenced by a patient's psychological state. Nearly 80% of patients scheduled to undergo a planned high-risk operation endorse feelings of preoperative anxiety.<sup>7</sup> Perioperatively, anxiety, depression, and perceived self-efficacy can have physiologic manifestations such as increased pain sensitivity, risk of infection, healing time, and can have an impact on feelings of anxiety and depression scales even a year after surgery.<sup>8-10</sup> In pre-COVID-19 health care delivery, the impact of patient anxiety on outcomes was addressed through screening and preoperative psychological therapy.<sup>11</sup> Anxiety-reducing interventions focus on patient-centered models of teaching, emphasizing the use of the pain scale, transitions of care, concerns of caregivers, and discharge education.<sup>8</sup> During the pandemic, many hospital systems chose to implement visitor restrictions in clinics, preoperative and postoperative holding areas, waiting rooms, and inpatient rooms. These limitations presented patients with the challenge of hospitalization alone without caregivers or support network. The flow of information between family members, patients, and physicians was hampered. Prior to the pandemic, caregivers could learn skills such as drain care, dressing changes, and medication regimens through observation and in talking with the care team. Removing visitors from the hospital took away this learning opportunity and forced patients to rely on themselves or use verbal instructions over the phone. The decrease in face-to-face, personalized discharge teaching has been linked to significantly higher rates of readmission following discharge.<sup>12</sup>

The authors perceived the impact of COVID-19-related policy changes on their patients anecdotally and wished to quantify the effects. The study was designed to understand and characterize the patient perspective at the perioperative phase of care during COVID-19 policy changes at a single academic institution. We sought to determine if policy changes were perceived as anxiety-provoking or anxiety-relieving in the context of the global pandemic and surgical care. Further, by stratifying patient subpopulations, we planned to identify any subgroup differences in perception of the health system operational changes. Our findings revealed generally low anxiety, acceptance of altered operations, and durable care satisfaction, with the exception of elevated anxiety reaching statistical significance in patients younger than 60 years of age.

## Methods

This research was approved for subject recruitment by the Institutional Review Board for Human Subjects Research. An investigator-generated survey using a Likert 5-point scale was used to assess causes of patient anxiety regarding the risk of COVID-19 itself, changes in hospital procedures, patient satisfaction, and overall quality of life. RAND-36 sub-scales were also used as a validated survey tool to quantify physical health and well-being. Additionally, subjects were asked to provide demographic and surgery-specific data such as procedure type, duration of hospitalization, and if their procedure was delayed (Figure 1).

The survey was open to all patients who received non-emergent general surgery from March 13, 2020 through September 29, 2020 at a single, academic institution. Dates of inclusion were chosen based on the first unofficial national call by the US Surgeon General for US Hospitals to cancel elective procedures on March 13, 2020. The end date of September 30, 2020 was chosen as it represented a plateau of COVID-19 case counts in the region.<sup>13</sup> Patients who had previously agreed to be contacted through the institution's electronic medical portal (MyChart) were surveyed. Patients who received urgent or emergent surgeries, organ transplant, and duplicate or repeated surgeries were excluded (Figure 2). Qualifying patients were contacted with a recruitment message and webpage link to complete the survey hosted in REDCap. Study data were collected and managed using REDCap electronic data capture tools.<sup>14,15</sup> REDCap (Research Electronic Data Capture) is a secure, web-based software platform designed to support data capture for research studies.

Comparative analysis was conducted on the sample mean on the 5-point Likert scale. Responses were grouped as low (rank of 1 or 2), neutral (3), and high (4 or 5). Cohort analysis of subgroup responses was examined by gender, race, and age. For age analysis, the number sixty

At the time of your surgery, how much anxiety did the following cause you?					
	No anxiety	A Little anxiety	Mild anxiety	Moderate anxiety	Severe anxiety
How anxious were you about not having full access to your healthcare providers, like surgeons, nurses, and nurse navigators during your hospital stay?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Impact of Staying Alone</b>					
How comfortable were you being alone during your hospital stay?	<input type="radio"/> Very uncomfortable <input type="radio"/> Uncomfortable <input type="radio"/> Neutral <input type="radio"/> Comfortable <input type="radio"/> Very comfortable				
<b>Discharge and Safety</b>					
How were your discharge instructions explained to you at discharge?	<input type="radio"/> You in person <input type="radio"/> You over the phone <input type="radio"/> Caregiver in person <input type="radio"/> Caregiver over the phone <input type="radio"/> Other, please explain				
<b>Care Evaluation and Satisfaction</b>					
Looking back at your experience, how satisfied are you that you proceeded with surgery?	<input type="radio"/> Very unsatisfied <input type="radio"/> Unsatisfied <input type="radio"/> Neutral <input type="radio"/> Satisfied <input type="radio"/> Very satisfied				

**Figure 1.** Selected questions from our investigator-generated survey addressing anxiety, impact of staying alone in the hospital, discharge and safety, and overall care satisfaction.

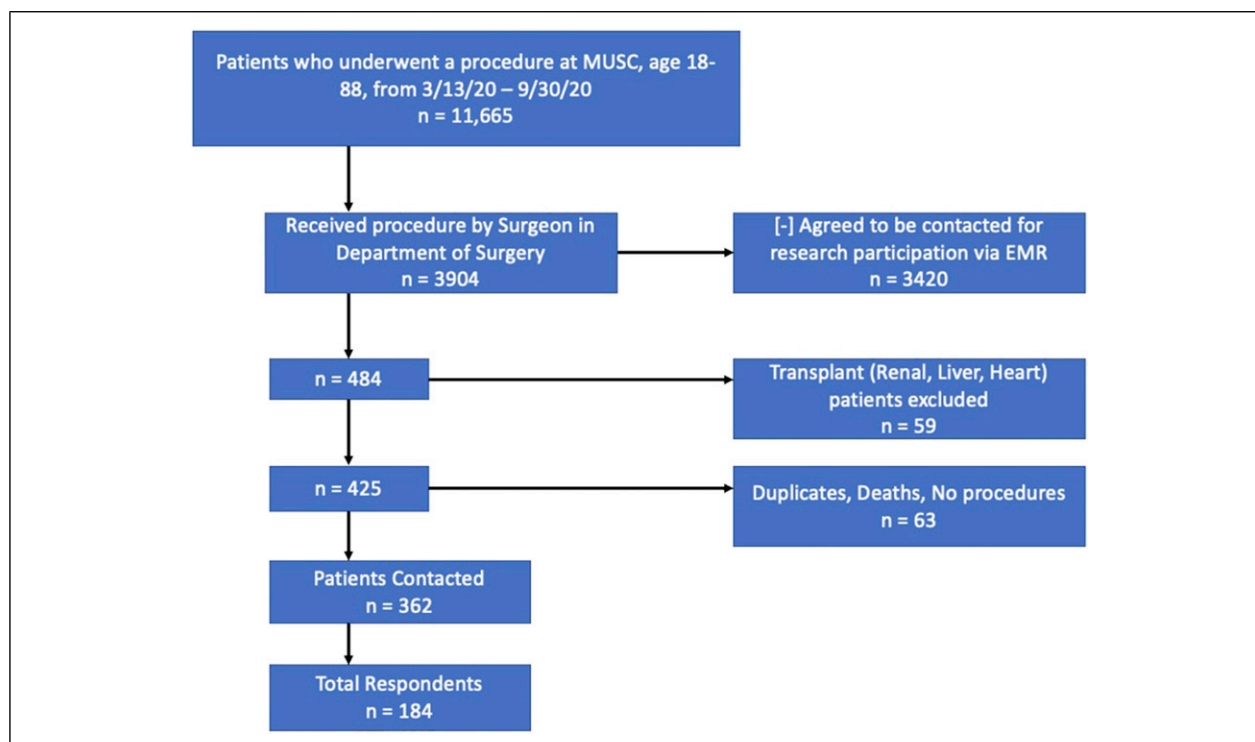
was used as a cutoff between a younger population and older population as it reflected the approximate mean of the sample surveyed. The age of sixty stratified our sample into 2 almost equivalently sized groups, thus was used for further analysis. Comparative statistics including chi-square analysis and unpaired 2-tailed t-tests were completed using GraphPad Prism and Microsoft Excel. A *P* value of .05 was used for statistical significance.

## Results

Surveys were distributed to 362 patients with a response rate of 51% (*n* = 184) (Figure 2). Respondents were most likely to be female (75.3%, *n* = 140) and white (84.4%, *n* = 157) with a median age of 61 years (range 18-88). African American respondents totaled 15.1% (*n* = 28) and .5% (*n* = 1) American Indian or Alaskan Native. A large proportion of respondents, 77.4% (*n* = 123), did not report being aware of a delay in their surgery date (Table 1). Patients endorsed the following types of procedures: plastic surgery, endocrine, oncologic, general, acute care, cardiothoracic, bariatric and foregut, vascular, and colorectal (Appendix 1). For patients without delay, we completed subgroup analyses. We completed cohort analysis comparing responses endorsing anxiety graded

on a 5-point Likert scale, based on age (<60 years old [*n* = 88] vs >60 [*n* = 96]), sex (female vs male), and by race (African American vs white).

Subjects ranked their anxiety from 1 “no anxiety” to 5 “severe anxiety” and overall our sample demonstrated low anxiety across all assessed causes, with a mean range of 1.48-2.28 (Table 2). In cohort group comparison by 2-tailed unpaired t-test, a statistically significant increase of anxiety was noted between the <60-year-old patients and >60 years old regarding visitor limitation (2.69±.38 v 1.91±.28, *P* = .002), and going through the discharge process alone (2.60±.39 v 1.85±.30, *P* = .003) (Table 2, Figure 3a). For patients <60 years old, anxiety was also elevated during screening procedures (*P* = .058). Anxiety related to learning of COVID-19 spread approached significance when comparing African American vs white respondents (2.22±.6 v 1.56±.18, *P* = .053) (Figure 3b). Anxiety regarding visitor limitations between female and male respondents also approached significance (2.40±.29 v 2.31±.24, *P* = .056) (Figure 3c). Patients who were aware and reported a delay in their surgery overall were satisfied with their care (80.65%), felt it increased their safety (43.48%), and agreed with the institution's decision to delay their surgery (81.82%) (Table 3).



**Figure 2.** Study design and subject recruitment summary, with a response rate of 50.8%.

**Table 1.** Cohort Demographics.

	n = 186 (100%)
Age	
Mean ± SD	58.0 ± 14.3
Gender	
Female	140 (75.6)
Male	45 (24.3)
Race	
White	157 (84.4)
Black	28 (15.1)
Other	1 (.5)
Surgical delay	
No	110 (76.4)
Yes	34 (23.6)

Respondent demographics and mean age with standard deviation. Data represented as n (%).

## Discussion

In this single-center survey study evaluating the mental health impacts of COVID-19 on surgical patients, we found that overall, patients reported low levels of anxiety associated with protocols that changed the way care was delivered. There was some variation by age as younger patients endorsed increased levels of anxiety related to their surgery during the COVID-19 pandemic when compared with those  $\geq 60$  years old. These findings suggest that patients were very receptive to the dynamic

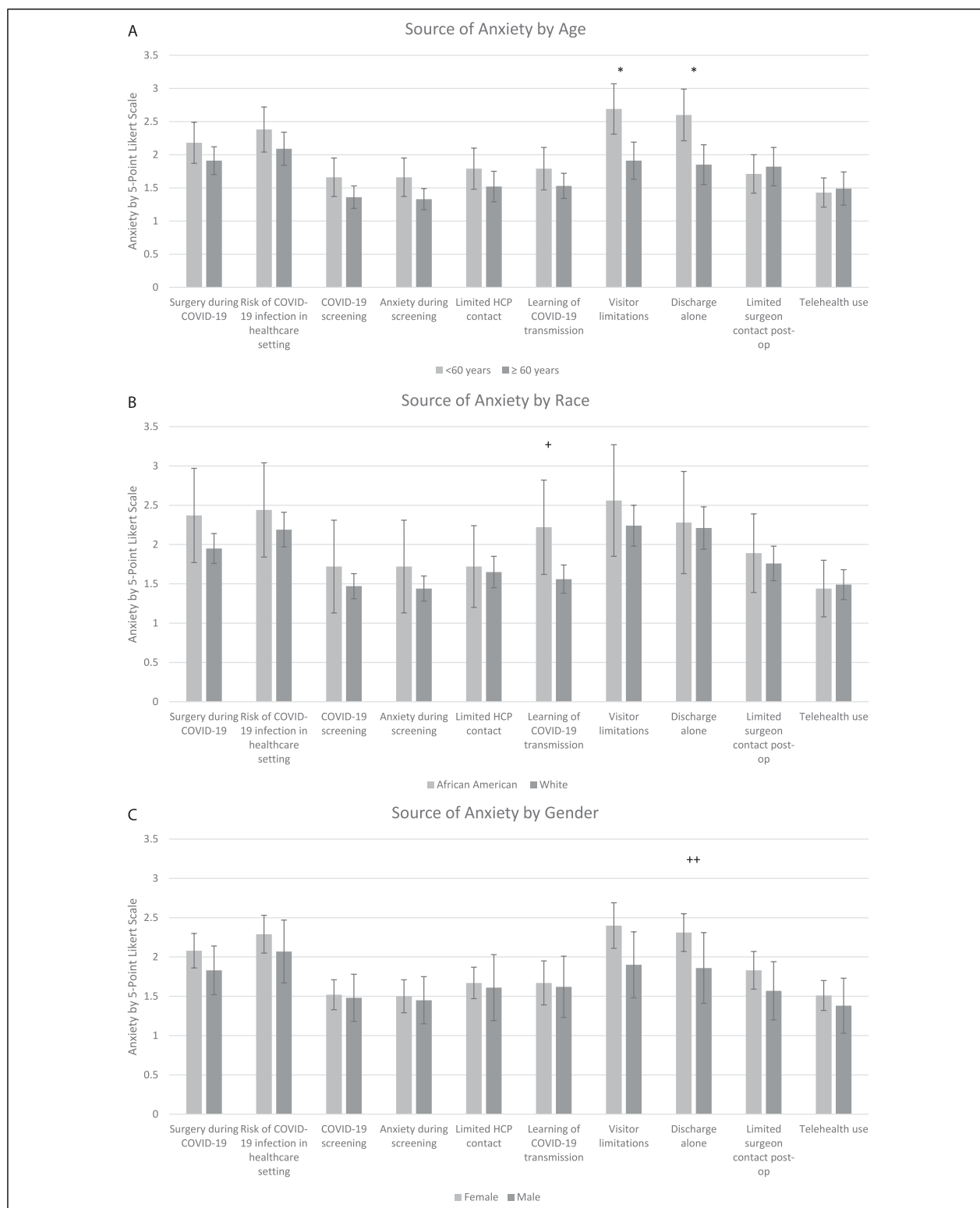
nature of the evolving pandemic and its impact on the health care system and on them as individuals. The pandemic was a novel entity and its impact on routine patient care was unknown. This paper helps to fill a gap in understanding how major changes in the health care system are perceived by patients and contributes to how hospitals and providers can aid patients in addressing foreseeable resulting barriers.

Early research indicated that advanced age and increased cardiovascular comorbidities were associated with worse clinical outcomes of COVID-19 infection.<sup>16</sup> Given these data, we expected older patients and those with chronic illnesses to have increased anxiety and stress regarding COVID-19 infection. We also anticipated the older population to be less adaptable to evolving telehealth and virtual health care options. However, our results demonstrated patients  $< 60$  years old rated higher anxiety than patients  $\geq 60$  years old in regard to limited visitation and going through discharge alone. Tejada et al also found younger patients endorsed significantly more anxiety and depression up to 1 year after their index procedure.<sup>9</sup> The authors also noted that female gender, lower socioeconomic status, and limited psychosocial support were linked to higher anxiety and depression 1 year following an index procedure.<sup>9</sup> Our findings reiterate those of Tejada et al.<sup>9</sup> Discharge alone and lack of visitation were the sources of anxiety we assessed most linked to social support and were the only sources of anxiety to

**Table 2.** Survey Response by Cohort.

	Overall	By age			By race			By sex			
		<60 yrs	≥60 yrs	P value	AA	White	P value	Female	Male	P value	
Source of anxiety											
Surgery during COVID-19	2.02 ± .18	2.18 ± .31	1.91 ± .21	.154	2.37 ± .60	1.95 ± .19	.212	2.08 ± .22	1.83 ± .31	.195	
Risk of COVID-19 infection in health care setting	2.24 ± .20	2.38 ± .34	2.09 ± .25	.183	2.44 ± .60	2.19 ± .22	.449	2.29 ± .24	2.07 ± .40	.365	
COVID-19 screening	1.51 ± .16	1.66 ± .29	1.36 ± .17	.092	1.72 ± .59	1.47 ± .16	.432	1.52 ± .19	1.48 ± .30	.837	
Anxiety during screening	1.49 ± .16	1.66 ± .29	1.33 ± .16	.058	1.72 ± .59	1.44 ± .16	.383	1.5 ± .21	1.45 ± .30	.776	
Limited HCP contact	1.66 ± .19	1.79 ± .31	1.52 ± .23	.170	1.72 ± .52	1.65 ± .20	.814	1.67 ± .20	1.61 ± .42	.783	
Learning of COVID-19 transmission	1.66 ± .18	1.79 ± .32	1.53 ± .19	.178	2.22 ± .60	1.56 ± .18	.053	1.67 ± .28	1.62 ± .39	.828	
Visitor limitations	2.28 ± .24	2.69 ± .38	1.91 ± .28	<b>.002</b>	2.56 ± .71	2.24 ± .26	.424	2.40 ± .29	1.90 ± .42	.056	
Discharge alone	2.21 ± .25	2.60 ± .39	1.85 ± .30	<b>.003</b>	2.28 ± .65	2.21 ± .27	.842	2.31 ± .24	1.86 ± .45	.108	
Limited surgeon contact post-op	1.77 ± .20	1.71 ± .29	1.82 ± .29	.605	1.89 ± .50	1.76 ± .22	.640	1.83 ± .24	1.57 ± .37	.259	
Telehealth use	1.48 ± .17	1.43 ± .22	1.49 ± .25	.721	1.44 ± .36	1.49 ± .19	.827	1.51 ± .19	1.38 ± .35	.552	
Care satisfaction											
Satisfied	96 (88.89)	43 (93.48)	50 (84.75)	.487	14 (75.6)	82 (89.13)	.148	72 (88.89)	24 (88.89)	.283	
Neutral	4 (3.70)	1 (2.17)	3 (5.08)		2 (12.5)	2 (2.17)		3 (3.7)	1 (3.7)		
Unsatisfied	8 (7.41)	2 (4.35)	6 (10.17)		0 (0)	8 (8.7)		6 (7.41)	2 (7.41)		
Considered postponing surgery											
Yes	12 (11.11)	8 (17.39)	4 (6.78)	.94	5 (31.25)	7 (7.61)	.007	10 (12.35)	2 (7.41)	.483	
No	96 (88.89)	38 (82.61)	55 (93.22)		11 (68.75)	85 (92.39)		71 (87.65)	25 (92.59)		

Anxiety measured by 5-point Likert response values reported with ± 95% confidence interval.  
 Two-tailed unpaired t-test reported for level of significance.  
 Care satisfaction and consideration of surgery postponement are reported by categorical response counts and percentage per cohort group.  
 Yrs, years; W, white; AA, African American; HCP, health care provider; post-op, postoperatively or postoperative period.



**Figure 3.** a Anxiety comparison by age. Mean 5-point Likert scale response reported with 95% confidence interval shown as error bars. Significance reached for visitor limitations ( $P = .002$ ) and discharge alone ( $P = .003$ ) represented by (\*). b Comparing by race, learning of COVID-19 spread approaches significance with  $P = .053$ , represented by (+). c Comparing by gender, discharge alone approaches significance with a  $P = .056$ , represented by (++)

**Table 3.** The Experience of Patients Reporting Delay of Surgery.

Experience of patients reporting delay of surgery	
Delay in surgery n = 34 (100%)	
Satisfaction with Care	
Satisfied	25 (80.65)
Neutral	3 (9.68)
Delay increased safety	
Agree	10 (43.48)
Neutral	11 (47.83)
Disagree	2 (8.7)
Impact of delay on overall health	
Positive	6 (18.75)
Neutral	21 (65.63)
Negative	5 (15.63)
Impact of delay on quality of life	
Positive	5 (16.13)
Neutral	18 (58.06)
Negative	8 (25.81)
Agree with decision to delay surgery	
Agree	27 (81.82)
Neutral	5 (15.15)
Disagree	1 (3.03)

The experience of patients delaying surgery count (relative percentage) reported.

Data represented n (%).

achieve statistical significance. The differences in reported anxiety level by age are likely multi-factorial and all variables are not captured in this survey study. Age likely influences overall health, time to recovery with implications on career and family, and may introduce generational differences in the willingness to discuss and endorse mental health challenges, such as anxiety and stress.

Our data revealed patients felt low levels of anxiety regarding possible contraction of COVID-19 from seeking care in a public place like a hospital. Additionally, patients overall endorsed feeling their health and safety was protected by altered operations. Even patients who endorsed a delay in their elective procedures demonstrated satisfaction with their care and viewed the delay as in-line with their best interests. Patients indicated no significant negative impact on overall health or quality of life, or overall safety, and agreed with the institutional decision to delay surgery. In a multi-hospital quality assurance review by Silvera et al,<sup>17</sup> patients did not report experiencing a large change in overall satisfaction with their care during the COVID-19 pandemic response. These data highlight the importance of clear communication with patients regarding the underlying reason for surgical delay. There was likely a strong interplay of outside messaging to patients through the media and national public health statements that supported hospital decisions. These communications likely made patients more accepting of a delay in surgery and demonstrated the personal and public value of delaying care.

Limited descriptions of patient's perceptions of COVID-19 protocols for elective and non-elective surgery in the initial COVID-19 response have been published. Doglietto et al describe the cohort experience of neurosurgical patients in the immediate resumption of elective surgery in Northern Italy following the initial COVID-19 case surge.<sup>3</sup> The authors describe similar patient satisfaction and acceptance of screening protocols, social distancing, and increased sanitation processes to our data. Their study noted, for oncologic patients, anxiety focused mainly on the risk of disease progression during surgical delay, with a median of 30 days duration proving to be more stressful than the risk of COVID-19 infection.<sup>3</sup> This further reiterates that patient concerns of COVID-19 infection were likely minimized so that concern of primary disease and social support primarily drove patient anxiety.

These findings have implications to the manner of ongoing health care delivery in the context of the evolving COVID-19 pandemic, and can inform providers and hospitals as they address situations of future health care disruptions, for example, future pandemics, natural disasters, and mass casualty events. Our institution experienced a 1 month delay of elective surgery, similar in duration to other COVID-19 investigations and analyzed disruptions from natural disasters.<sup>3,18</sup> Patients largely transitioned to telehealth modalities while maintaining high satisfaction with care, supporting the growing acceptance and durable nature of telehealth medicine. Patients of all ages, sex, and race sampled in our study largely maintained satisfaction with their care and accepted the changes in protocol as an effect of the current ecosystem of health care delivery. Furthermore, the critical role of social support for inpatients, previously described and reiterated in our findings, demonstrates the utility of a "subjective advocate" as outlined by Silvera et al<sup>17</sup> as a modality for health care systems to supplement lacking social support during times of visitor limitation. Given our description of differences by age and stage of inpatient hospitalization, we hope our results can contribute to an informed implementation of said "subjective advocates."

This study seeks to understand the impact of COVID-19 on surgical patients, but certain limitations in this work must be acknowledged. While the survey queried all patients undergoing elective surgery, the delivery platform required internet and access to the electronic medical portal which may have selected patients who would feel comfortable adapting to electronic health care delivery platforms. Our study sample (n = 184) is small compared to the volume of patients that received surgery during this time, but reflects a response rate of 50.8% of patients who met inclusion criteria (Figure 2). This convenience sampling method captured the responses of patients that were noticeably different in race and gender than the population of patients receiving elective surgery at our institution. Mean age of our sample cohort, however, was reflective of average age of the surgical patient (58 vs 54.4

years, respectively). With this in mind, generalizability of the results of this study is limited and may not apply to health care settings that do not have a similar demographic breakdown as sampled here. Additional confounding factors include that while the majority of the patient population does have access to the internet, the ability to access and fill out the survey may imply a higher level of comfort with technology.<sup>19</sup> The type of surgical procedure may influence level of anxiety, but given that this was an anonymous survey, patient-reported procedure type could not be verified; thus, this variable was not analyzed separately. The variation in the severity of the initial COVID-19 pandemic experience within communities also likely informs anxiety and stress regarding infection and the perception of risk associated with disease impacting the generalizability of these findings. The patient perceptions of COVID-19 in our region are expectantly different than those who experienced significantly greater case fatality rates such as the New York Metropolitan Area and Northern Italy.

In conclusion, we can extract that patients in this survey demonstrated resilience and tolerated immediate and evolving changes to health care delivery. Most patients cited satisfaction with their care, and minimal to neutral stress with changes in policy and additional safety protocols. This suggests that medical centers and health care providers should not hesitate to make changes to health care delivery when unique circumstances arise, and that communication with patients, whether it be virtual or in-person, can still achieve high satisfaction.

### Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

### Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

### ORCID iD

Andrew T. Dippre  <https://orcid.org/0000-0002-1238-0317>

### References

- Al-Jabir A, Kerwan A, Nicola M, et al. Impact of the coronavirus (COVID-19) pandemic on surgical practice - Part 1. *Int J Surg*. 2020;79:168-179.
- Mittel AM, Panzer O, Wang DS, et al. Logistical considerations and clinical outcomes associated with converting operating rooms into an intensive care unit during the coronavirus disease 2019 pandemic in a New York city hospital. *Anesth Analg*. 2021;132(5):1182-1190.
- Doglietto F, Vezzoli M, Biroli A, et al. Anxiety in neurosurgical patients undergoing nonurgent surgery during the COVID-19 pandemic. *Neurosurg Focus*. 2020;49(6):E19.
- Al-Jabir A, Kerwan A, Nicola M, et al. Impact of the Coronavirus (COVID-19) pandemic on surgical practice - Part 2 (surgical prioritisation). *Int J Surg*. 2020;79:233-248.
- American College of Surgeons. *COVID-19 Guidelines for Triage of Cancer Surgery Patients*. American College of Surgeons; 2021. <http://www.facs.org/covid-19/clinical-guidance/elective-case/cancer-surgery>. Accessed June 6, 2021.
- Purnell S, Zheng F. Safety of surgical telehealth in the outpatient and inpatient setting. *Surg Clin North Am*. 2021;101(1):109-119.
- Zemla AJ, Nowicka-Sauer K, Jarmoszewicz K, Wera K, Batkiewicz S, Pietrzykowska M. Measures of preoperative anxiety. *Anaesthesiol Intensive Ther*. 2019;51(1):64-69.
- Bailey L. Strategies for decreasing patient anxiety in the perioperative setting. *AORN J*. 2010;92(4):445-60.
- Gonzalez-Saenz de Tejada M, Bilbao A, Baré M, et al. Association between social support, functional status and change in Health Related Quality of Life and changes in anxiety and depression in colorectal cancer patients. *Psychooncology*. 2017;26(9):1263-1269.
- Caumo W, Schmidt AP, Schneider CN, et al. Risk factors for preoperative anxiety in adults. *Acta Anaesthesiol Scand*. 2001;45(3):298-307.
- Levett DZH, Grimmer C. Psychological factors, prehabilitation and surgical outcomes: evidence and future directions. *Anaesthesia*. 2019;74 Suppl 1(Suppl 1):36-42.
- Greysen SR, Harrison JD, Kripalani S, et al. Understanding patient-centred readmission factors: a multi-site, mixed-methods study. *BMJ Qual Saf*. 2017;26(1):33-41.
- SCDHEC. *South Carolina County-Level Data for COVID-19*. SCDHEC; 2020. <https://scdhec.gov/covid19/south-carolina-county-level-data-covid-19>. Accessed October 20, 2020.
- Harris PA, Taylor R, Thielke R, Payne J, Gonzalez N, Conde JG. Research electronic data capture (REDCap)—a metadata-driven methodology and workflow process for providing translational research informatics support. *J Biomed Inform*. 2009;42(2):377-81.
- Harris PA, Taylor R, Minor BL, et al. The REDCap consortium: Building an international community of software platform partners. *J Biomed Inform*. 2019;95:103208.
- Richardson S, Hirsch JS, Narasimhan M, et al. Presenting characteristics, comorbidities, and outcomes among 5700 patients hospitalized with COVID-19 in the New York city area. *JAMA*. 2020;323(20):2052-2059.
- Silvera GA, Wolf JA, Stanowski A, Studer Q. The influence of COVID-19 visitation restrictions on patient experience and safety outcomes: A critical role for subjective advocates. *Patient Exp J*. 2021;8(1):30-39.
- Man RX, Lack DA, Wyatt CE, Murray V. The effect of natural disasters on cancer care: a systematic review. *Lancet Oncol*. 2018;19(9):e482-e499.
- Khariwala SS, Weinreich HM, McCoul ED, et al. Leveraging COVID-19-inspired changes to advance otolaryngology-here to stay. *JAMA Otolaryngol Head Neck Surg*. 2020;146(7):605-607.



Appendix I

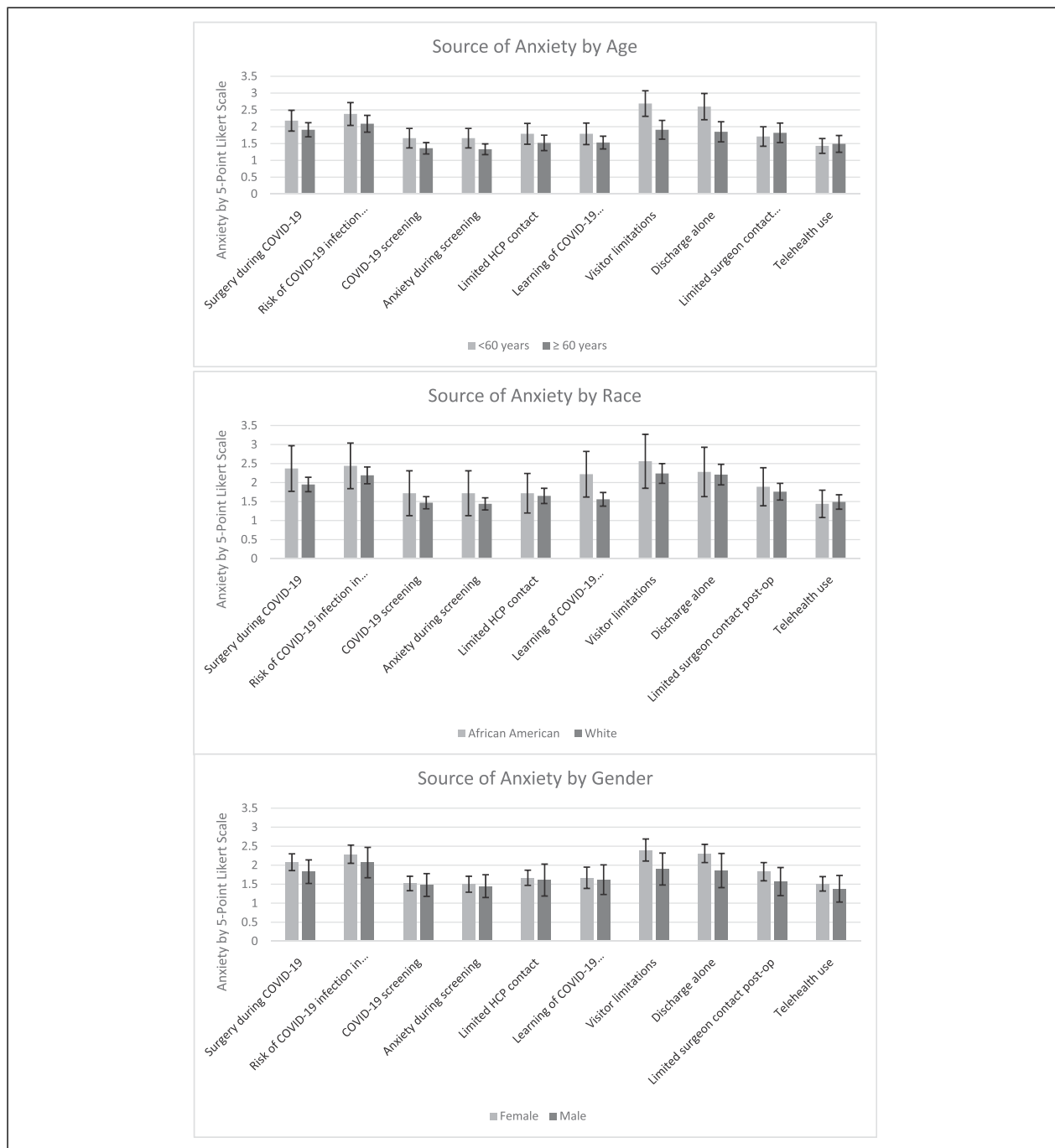


Figure A1. Surgical Procedure Type.