

# The impact of delayed nonurgent surgery during the COVID-19 pandemic on surgeons in Alberta: a qualitative interview study

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## Abstract

**Background:** During the COVID-19 pandemic, nonurgent surgeries were delayed to preserve capacity for patients admitted with COVID-19; surgeons were challenged personally and professionally during this time. We aimed to describe the impact of delays to nonurgent surgeries during the COVID-19 pandemic from the surgeons' perspective in Alberta.

**Methods:** We conducted an interpretive description qualitative study in Alberta from January to March 2022. We recruited adult and pediatric surgeons via social media and through personal contacts from our research network. Semistructured interviews were conducted via Zoom, and we analyzed the data via inductive thematic analysis to identify relevant themes and subthemes related to the impact of delaying nonurgent surgery on surgeons and their provision of surgical care.

**Results:** We conducted 12 interviews with 9 adult surgeons and 3 pediatric surgeons. Six themes were identified: accelerator for a surgical care crisis, health system inequity, system-level management of disruptions in surgical services, professional and interprofessional impact, personal impact, and pragmatic adaptation to health system strain. Participants also identified strategies to mitigate the challenges experienced due to nonurgent surgical delays during the COVID-19 pandemic (i.e., additional operating time, surgical process reviews to reduce inefficiencies, and advocacy for sustained funding of hospital beds, human resources and community-based postoperative care).

**Interpretation:** Our study describes the impacts and challenges experienced by adult and pediatric surgeons of delayed nonurgent surgeries because of the COVID-19 pandemic response. Surgeons identified potential health system-, hospital- and physician-level strategies to minimize future impacts on patients from delays of nonurgent surgery.

The COVID-19 pandemic led to an increased demand for hospital beds to care for patients with COVID-19. In response, strategic planning to preserve scarce material and human resources were developed, and one approach was delaying nonurgent surgeries during periods of increased hospitalizations.<sup>1-3</sup> Nonurgent surgeries, defined as surgeries that are medically necessary but can be scheduled in advance, were radically affected by these delays, leading to increased surgical wait times and backlogs.<sup>4,5</sup>

Providing timely surgical care has been challenging even before the COVID-19 pandemic, with 30% of scheduled hip, knee or cataract surgeries routinely exceeding prespecified Canadian wait-time benchmarks.<sup>6</sup> This strain on surgical care delivery has been exacerbated by the COVID-19 pandemic, with an estimated 28 million surgeries cancelled worldwide during the first 12 weeks of the pandemic.<sup>7</sup> Longer wait times for surgery expose patients to higher risks of poorer health-related quality of life, progression of underlying conditions and worse surgical outcomes.<sup>6,8-11</sup> Furthermore, surgical delays lead to increasing backlogs of nonurgent surgeries.<sup>12,13</sup> There has been a

focus on the impact of delaying nonurgent surgeries on surgical patients and health care systems; however, less is known about the experience of surgeons both professionally and personally, despite the acknowledgement of substantial pandemic-related burnout among health care providers.<sup>14-17</sup> Understanding the

**Competing interests:** Mary Brindle reports a grant from the Canadian Institutes of Health Research to explore how the Surgical Safety Checklist could be improved, a grant from Maternal Newborn Child & Youth to explore the effectiveness of a neonatal Enhanced Recovery After Surgery (ERAS) protocol, honoraria for speaking at Hong Kong University Department of Surgery and the University of Manitoba (both < \$1000), an unpaid role on the Data and Safety Monitoring Board for a US randomized controlled trial on ERAS in pediatric patients and an unpaid position as secretary of the ERAS Society. No other competing interests were declared.

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impact of surgical delays on surgeons is an important knowledge gap to address to support surgeons in their clinical environment during periods of high patient volume. In this qualitative study, we aimed to describe the impact of delaying nonurgent surgeries during the COVID-19 pandemic on pediatric and adult surgeons in Alberta from the surgeons' perspective.

## Methods

We used interpretive description, which was developed for disciplines in which pragmatic approaches to understanding and developing clinical recommendations are needed, as our methodological framework to align with a constructivist and naturalistic approach to inquiry aimed at generating clinically contextual knowledge.<sup>18,19</sup>

In Alberta, Canada, there were 5 waves of COVID-19 cases between March 2020 and March 2022; after March 2022, reliable tracking data have been limited. Each wave included temporary public health measures to mitigate SARS-CoV-2 infections that were subsequently eased between waves. During wave 1 in March 2020 and wave 2 in October 2020, school class cancellations, non-essential business closures and group size gathering restrictions were implemented. Delays in nonurgent surgical procedures to prepare for potential COVID-19 patients requiring hospitalization occurred during wave 1. Masking recommendations were introduced in April 2020. During wave 3 in March 2021, restrictions included limitations on capacity at businesses, restaurants and social gatherings. Wave 4 in August 2021 similarly required introduction of capacity restrictions on business, restaurants and social gatherings, with the addition of requirements for proof of vaccination. During this wave, 60%–70% of nonurgent surgeries were delayed within the province to manage high strain on ICU bed capacity (<https://covid-tracker.chi-csm.ca/>). Wave 5 in January 2022 saw minimization of public health precautions, with cessation of requirements for proof of vaccination (February 2022) and removal of all public health measures with some exceptions in health care settings in March 2022.<sup>20</sup> During the multiple waves of COVID-19, 81 600 surgeries were delayed in Alberta.<sup>21</sup> Pandemic interventions were uniformly implemented across all health zones within Alberta and are further outlined in Figure 1.

This study is reported according to the Consolidated Criteria for Reporting Qualitative Research checklist (Appendix 1, Supplementary Table 1, available at [www.cmajopen.ca/content/11/4/E587/suppl/DC1](http://www.cmajopen.ca/content/11/4/E587/suppl/DC1)).<sup>22</sup>

### Participant selection

This study used a convenience sampling approach. We recruited participants through social media posts on Twitter and through email invitations to personal email addresses via the team's research networks. Participants who spoke English, who were pediatric and adult surgeons working in any health care setting in Alberta during the COVID-19 pandemic, and who were able to consent to participate were eligible for participation.

### Data collection

We conducted semistructured interviews from Jan. 21, 2022, to Mar. 15, 2022. An interview guide was developed by members of the research team, and it was informed by the experiences of our clinician team members during the COVID-19 pandemic. The semistructured interview guide was reviewed by 2 senior surgeons with experience in health services research and health care delivery for feedback and refinement before administration (Appendix 1), which resulted in 2 additional questions inquiring into the personal impact of surgical delays on surgeons. Participant demographic characteristics were collected using standardized questions at the end of the interview.

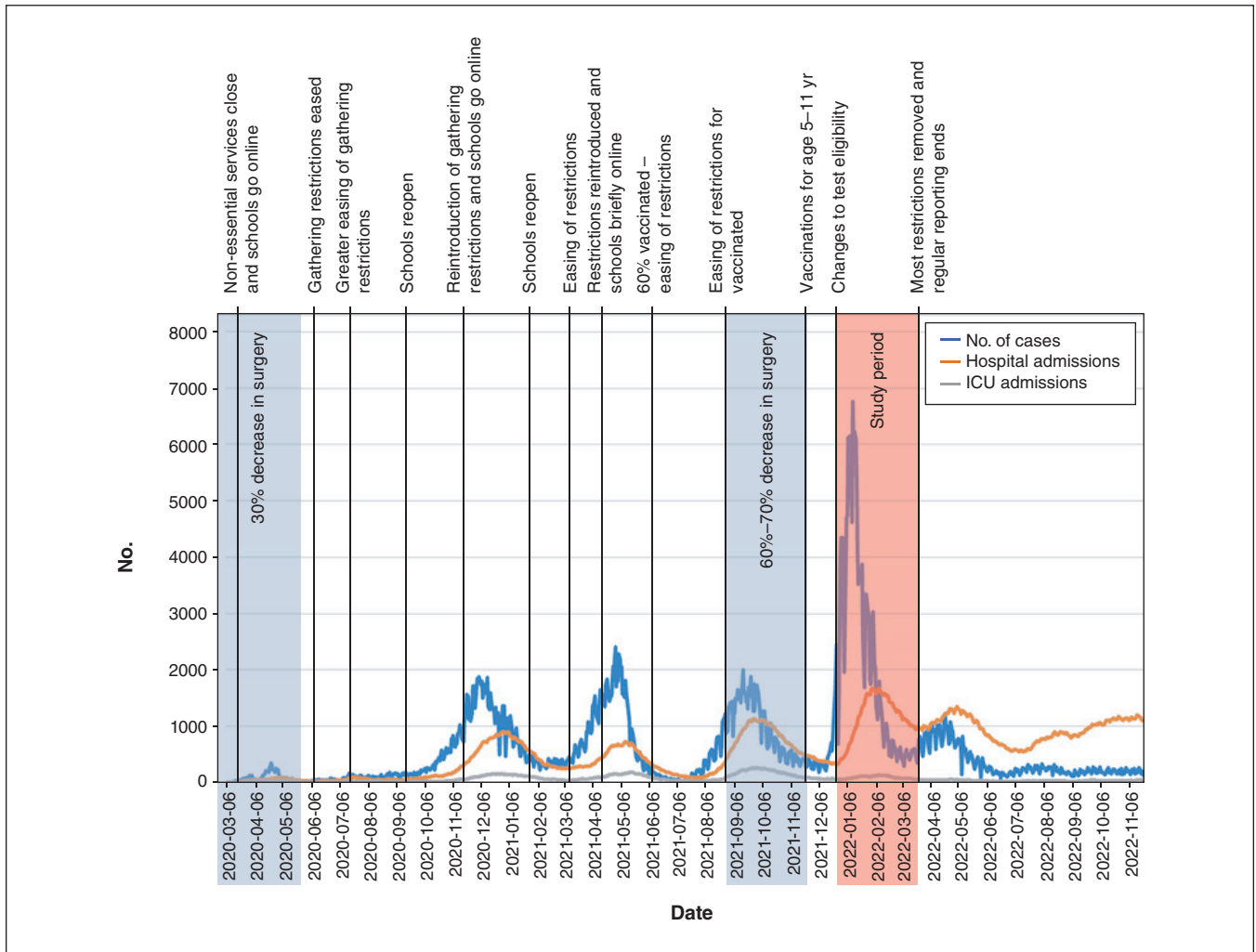
Three female researchers (2 graduate students and 1 research associate) trained in qualitative methods (E.S., J.K. and C.S.) conducted all individual interviews over Zoom (Zoom Video Communications) with only the interviewer and participant present. Password-protected individual links for the interview (meeting) were used with the waiting room functions activated to allow the interviewer to admit participants to the interview securely. Zoom was used as the platform to conduct interviews to comply with public health recommendations and safety measures. Interviews were audio-recorded after participant oral consent was obtained, and subsequently transcribed verbatim, verified and deidentified. Transcripts were not returned to participants. Field notes were kept and informed interpretation of the transcripts.

### Data analysis

Transcripts were imported into NVivo12 (QSR International) for data analysis. Data were analyzed using inductive thematic analysis described by Braun and Clarke.<sup>23</sup> Two female researchers (N.J. and E.S.), who were trained in the inductive qualitative analysis approach of Braun and Clarke, completed all analyses. Each transcript was analyzed and coded independently and in duplicate. Researchers held weekly meetings to develop a coding frame that encompassed key features of the data and to discuss discrepancies in the coding frame. Researchers applied the coding frame determined by consensus to their transcripts following each meeting. Subsequent meetings focused on merging codes into themes reflecting participant responses. Participant recruitment and coding meetings continued until no new codes or further themes were identified with subsequent interviews and data analysis. Trustworthiness (credibility, dependability and confirmability) was considered. Credibility included member checking by researchers (2 researchers administering interviews) and participants (2 participants reviewed the results and interpretation). Dependability included maintaining an audit trail of iterative coding meetings with inquiry audits provided internally by the 2 primary analysts (N.J. and E.S.). Confirmability was addressed by holding weekly meetings that included open and reflexive discussion that challenged the researchers' perspectives to minimize personal bias.

### Reflexivity

Interviewers (E.S., J.K. and C.S.) did not have a relationship with participants before the interviews. They had



**Figure 1:** The study was conducted shortly after a period of high COVID-19 hospitalizations, during which 60%–70% of nonurgent surgeries were delayed (the second strategic decrease in surgical volume). Despite a return to normal surgical volume during the study period, there was still a higher than baseline number of hospitalizations and a high incidence of COVID-19. Note: ICU = intensive care unit. Data source: <https://covid-tracker.chi-csm.ca/>

research experience in surgical care during the COVID-19 pandemic, as they had previously conducted interviews for a study on the impact of pandemic-related surgical delays from the patient perspective.<sup>24</sup> All interviewers had formal graduate-level training in qualitative methods (E.S. and J.K.) or experiential training conducting semistructured interviews (C.S.). All interviewers had experience handling semistructured interviews, having completed interviews for other qualitative studies led by this research group related to surgical delays during the COVID-19 pandemic. Before interviews started, all questions from the interview guide were reviewed with the interviewers, and practice interviews were conducted among the team. None of the interviewers (E.S., J.K. and C.S.) or analysts (N.J., E.S. and K.M.S.) were surgeons or had surgery (planned or completed) during the pandemic. One of the primary analysts (N.J.) is an intensivist who cares for surgical patients admitted to intensive care units.

### Ethics approval

This study was approved by the University of Calgary Conjoint Health Research Ethics Board (REB20–0753). The informed consent process occurred before interviews and included sending participants an email outlining the study objectives, and the informed consent script detailing the interview and data analysis process, providing opportunities to answer participant questions and obtaining oral informed consent.

### Results

Twelve interviews were completed (9 adult surgeons and 3 pediatric surgeons). Participant characteristics are described in Table 1. Interview durations ranged from 21 minutes 54 seconds to 42 minutes 7 seconds. All participants practised within the urban setting, with all participants except for 1 working within an academic environment. Participants worked in hospital institutions with 269 to more than 1100

**Table 1: Characteristics of participant surgeons**

Characteristic	No. (%) of participants <i>n</i> = 12
Patient population	
Adult	9 (75)
Pediatric	3 (25)
Age category, yr	
20–29	0 (0)
30–39	2 (17)
40–49	5 (42)
50–59	3 (25)
≥ 60	2 (17)
Sex	
Female	3 (25)
Work environment*	
Academic	11 (92)
Nonacademic	2 (17)
Surgical practice	
Dentistry	1 (8)
Head and neck	3 (25)
Gynecology	2 (17)
General	2 (17)
Orthopedics	3 (25)
Thoracic	1 (8)
Work experience in role, yr	
0–5	2 (17)
6–10	2 (17)
11–15	3 (25)
≥ 16	5 (42)

\*One participant reported working in both academic and nonacademic environments.

patient beds. Two participants had dual roles as surgeons and health care administrators.

Participants identified themes related to their own experiences during the COVID-19 pandemic as well as their perceptions of the impact of the pandemic on the health system and surgical services. Six major themes were identified: accelerator for a surgical care delivery crisis, health system inequity, system-level management of disruptions in surgical services, professional and interprofessional impact, personal impact, and pragmatic adaptation to health system strain. Quotations illustrating themes and all identified subthemes are provided in Table 2.

**Accelerator for a surgical care delivery crisis**

Surgeons believed the COVID-19 pandemic unmasked and exacerbated long-standing health system issues related to the delivery of surgical care. Surgeons described strain on the health

system before the pandemic and the effect of evolving surgical demand during the pandemic (quotation 1 [Q1]).

Surgeons perceived that delays on nonurgent surgeries were responsible for additional consequences on patient outcomes, such as increased risk of adverse events, less predictable outcomes due to more complex surgeries being required, and increased chronic pain (Q2). Surgeons believed that these additional surgical delays prompted some patients to explore free-standing facilities dedicated to providing surgical care, with other patients presenting with advanced disease requiring urgent interventions owing to loss of function (e.g., joint collapse and pain crisis) (Q3 and Q4). Cancer surgeons specifically highlighted that their patients were presenting for surgical consults with more advanced cancer, which they believed was a direct, deleterious effect of surgical delays due to pandemic-related capacity constraints (Q5).

**Health system inequity**

Surgeons perceived inequity in 2 ways during the COVID-19 pandemic: a disproportionate impact on surgical services compared with other health services, and an inequitable impact among different surgical services. Surgeons expressed their perception of the disproportionate burden of the pandemic response on surgery patients (Q6). Surgeons with higher volumes of nonurgent surgical cases reported feeling that surgical delays were particularly inequitable for their patient caseloads (Q7). Surgeons who performed mostly cancer surgeries, which were prioritized in Alberta throughout the COVID-19 pandemic, were empathetic to their surgical colleagues who experienced greater impacts to their surgical practices; however, cancer surgeons were not impervious to impacts on surgical practices and did report receiving informal recommendations regarding triage of their surgical cases (Q8). The feelings of inequitable care delivery were amplified by a lack of transparency and a lack of available resources to support patients and their families (Q9 and Q10).

**System-level management of disruptions in surgical services**

Approaches to delaying nonurgent surgeries varied through different waves of the pandemic based on the number of hospitalizations during a given time. Participants expressed that early in the pandemic during the first wave, postponing nonurgent surgeries felt excessive given the flat number of COVID-19 hospitalizations (Q11). Surgeons reported that COVID-19 pandemic responses were initially viewed as inefficient and, at times, too reactive, but became more informed by emerging evidence and experience (Q12).

Participants expressed tensions between surgeons and administrative leadership (e.g., department heads and medical executive committees) on the appropriate approach to making decisions on when to enact disruptions to surgical care to build hospital capacity, and the process for deciding which surgeries should be delayed (triaging). Surgeons did not feel included in triage decision-making (Q13).

**Table 2 (part 1 of 3): Exemplar quotations for themes and subthemes**

Quote no.	Subtheme	Exemplar quotation
<b>Accelerator for a surgical care delivery crisis</b>		
1	Health care system strain	“The Canadian health care system operates at maximum capacity all the time, even when there’s not a crisis, there’s no room for contingencies, right? Especially something as sustained as this. So when you run the system that tightly to stay within budget and I get it, health care is an overwhelmingly expensive proposition, but when you run on the edge of capacity all the time, you can ramp it up for a little while, like if there was a plane crash or something, people can work really hard for a week or 2, for a lot of hours but if for something like this that goes on for 2 years, the limits of our capacity become really apparent.” — Participant 003
2	Impact on patient-centred outcomes	“They’re quality-of-life surgeries, but at some point, quality of life diminishes to the point where it becomes medically imperative to do a joint replacement, say, for severe arthritis of the hip. So we’ve had a few more patients, at least in my subjective understanding or subjective experience, in the last 7 years of my faculty position that we’ve had to bring in as an urgent pain crisis or failure to thrive for a joint replacement, which we know has less, or has inferior outcomes relative to your traditionally electively scheduled joint replacements.” — Participant 008
3	Direct impact on care delivery	“... what’s happened as well is the number of emergencies or situations where people really need urgent care because they can no longer function or they’ve had, for example, a collapse of their joint, those numbers of cases are also increasing.” — Participant 004
4	Access to surgery	“Like I said before, we do have other options, since there are private surgical facilities, that we can go to. They were quite good at accommodating people.” — Participant 002
5	Direct impact on care delivery	“I think we have seen late presentations delayed to get to us, because those patients have to see their family doctor first, and then go on to see another ENT, and then get referred to us. So, that’s where I think a lot of the delays have happened, not so much once we see them to get them to the OR.” — Participant 009
<b>Health system inequity</b>		
6	Disproportionate burden on surgery patients	“So I feel this pandemic has disproportionately affected surgery, and I feel surgeons and our surgical patients and our surgical leaders have really made a lot of concessions and a lot of sacrifices for the greater good.” — Participant 008
7	Disproportionate burden on nonurgent surgeries	“It felt like it was not a priority and we were being told that everything was equitable. At one point I did receive some acknowledgement from leadership that our discipline was the last to catch up or the most behind on catching up in cancelled cases. And that was both validating and infuriating because all of this time they’ve been pretending that things are equitable.” — Participant 001
8	Resource constraint	“So just a couple of things off the top of my head, although, again, we were allowed to proceed with cancer surgery; there are some of us that do what would be considered some of the ultra radical surgeries which might take an entire day of surgery on 1 patient. And we were sort of informally told that we should not be booking these patients because it would be seen as sort of an inappropriate use of time and resources during this time. So the feeling was rather than operating on a 40-year-old to do something really aggressive in an entire day surgery, you should probably not doing that surgery and rather taking that day to do 3 cases or 3 patients.” — Participant 002
9	Lack of transparency	“And in terms of where we’re at now, how do I feel about this? I feel a little bit like this is [provincial health system]’s fault that they could have done a better job. I saw a recent [newspaper] article where they claimed they’re not cancelling surgeries that was published 12 hours after they cancelled my OR slate. I just feel, like, angry; at least be honest with the public about what’s happening.” — Participant 001
10	Lack of resource availability	“And I think a lot of our patients who are undergoing very life-challenging procedures have, I think, been neglected or denied having their appropriate supports with them through their voyages, at least within the hospital setting, which has been distressing.” — Participant 008

### Professional and interprofessional impact

Surgeons reported experiencing professional and interprofessional impacts due to surgical delays. Surgeons described having to adapt to new hospital processes, such as new policies surrounding personal protective equipment (Q14). They also expanded their administrative and professional roles by taking on new administrative tasks, such as seeing additional patients in clinic, cancelling surgical cases and talking to

patients regarding postponing their surgeries (Q15). Several surgeons felt worried about the consequences of the anticipated increased workload and burnout related to surgical delays (Q16). A few surgeons experienced a decrease in their workload with lower surgical volume during waves of increased COVID-19 hospitalizations (Q17). However, surgeons described a resurgence in workload after COVID-19 waves owing to health care workers requiring time off

**Table 2 (part 2 of 3): Exemplar quotations for themes and subthemes**

Quote no.	Subtheme	Exemplar quotation
<b>System-level management of disruptions in surgical services</b>		
11	Inharmonious implementation of policies	“Well, I think earlier in the pandemic there were alternatives, we just didn’t know, because we cancelled some surgeries and delayed surgeries, expecting the hospital to fill up when it was not yet full, and later in the pandemic, that shifted to letting things go until it’s full, which is a slightly different paradigm, which works better because we’re getting more done, because the hospital didn’t actually fill up to the point where we had to cancel everything, which we did for a couple weeks about a year ago.” — Participant 009
12	Response informed by experience and evidence	“I think that the surgical leadership will benefit from having to move through a pandemic and you can see it in the second and later waves, the communication and the strategies for dealing with it was more certain and more polished.” — Participant 006
13	Stakeholder involvement in triage decision-making	“And then what’s really silly is that now they’re no longer asking the surgeons if there’s certain patients on that list, according to acuity who should be removed. So then one of my colleagues last week had a very time-sensitive cancer surgery just arbitrarily removed, and somewhat ironically, had he been able to provide input he would’ve said, “This is the one that needs to be done. The other one or two, if you’re thinking of removing one, definitely remove that one because that one’s less acute.” — Participant 002
<b>Professional and interprofessional impact</b>		
14	Personal protective equipment use	“I think the secondary impact was just managing new requirements for personal protective equipment in the hospital, the additional burden and time and confusion around that.” — Participant 006
15	Additional professional tasks	“I think it’s not like the ORs closed and then we weren’t doing anything. A lot of people worked extra, they took the burden of cancelling cases, talking to the patients, hearing their concerns, rebooking them, and only to have them postponed again. And so that takes a toll, it’s frustrating and the normal flow is disrupted and that is very taxing and it’s a heavy burden.” — Participant 007
16	Workload changes	“... many of us feel quite worried about the clinical demands that we will face to try to meet the backlog ... I think many of us are worried about it being quite stressful.” — Participant 002
17	Workload changes	“That seems to be exaggerated with the pandemic that, going into a wave, we’re halfway through a wave, all of a sudden there’s fewer people coming in, and then kind of a month after a wave finishes, then there’s this crush of patients, often with advanced disease that have been delayed. So it’s always been a challenge in this career, is that the busyness sort of comes and goes, but it’s worse now.” — Participant 003
18	Interprofessional tension	“I would just, I think, you know, again, that concept of the haves and the have nots, right? They’ve really not even across surgical disciplines, but within departments, where you’ve got people who may be doing more benign surgery as opposed to cancer surgery. There has created quite a divisiveness, so I think that’s at a personal and on a professional level that has been kind of taxing.” — Participant 002
19	Interprofessional tension	“I think that there is certainly some discord brewing between services because I hear that certain disciplines [flouted] the restrictions by bringing patients in through the emergency room and claiming that [their] scheduled surgeries [were], now, urgent surgeries.” — Participant 001
<b>Personal impact</b>		
20	Financial consequences	“It’s had a significant impact on income, which I’m sure not ... there’s not a lot of sympathy for physicians being relatively high earners, their income is down, but the factor means there’s staff that still need to be paid out of my professional income. And so things are tight, tight enough that I’ve had to take loans to keep everything afloat.” — Participant 001
21	Public health measures	“I think it’s obviously personal restrictions, your lifestyle is significantly altered, the schooling of my children has been significantly changed, interactions with friends and family curtails and then obviously the stressors at work.” — Participant 007
22	Anticipatory burnout	“And so it’s just sort of created a lot of stress in the sense that I am now left with a long list of patients that are all way out of window. And there’s only so much I can do in terms of OR time because you sort of have to balance access to the OR for patients with your own, sort of, life.” — Participant 001
23	Work–life balance	“You know what, it’s been pretty amazing for me. It was nice. It was nice to take a break for a few months. It was nice to make some changes to the practice. We cancelled every appointment in our book and started fresh. We moved everybody who we’d cancelled and started fresh and kind of went down from there, but it was nice to make some changes to the schedule. It was lovely to have dinner with my family every night, instead of running kids to sports.” — Participant 002

**Table 2 (part 3 of 3): Exemplar quotations for themes and subthemes**

Quote no.	Subtheme	Exemplar quotation
<b>Pragmatic adaptation to health system strain</b>		
24	Alternative strategies for surgical care delivery	"... our ORs were closed for a little while there too. And so we were doing a lot of the cases in minor surgery." — Participant 005
25	Communication modalities	"So, I think it's more acceptable now even by families. Families kind of think, 'Oh, I should really see the surgeon.' I think they kind of go, 'You know what? It's okay not to see them.' Because they're so used to Zooming or telephones now." — Participant 003
26	Communication modalities	"And then rejigging, how patients could access chatting with us, given that they couldn't initially come physically to the clinics. And so, a transition to much more phone or other methods of consultation." — Participant 006
27	Shared decision-making	"And so the example that I just gave you, if I know based on ... If my surgical executive team tells me that, '[Name], you and your team are going to have to cut out 5 patients from your list next week.' Well, give us the opportunity to tell you who those patients are according to acuity, don't just randomly start crossing off names because then that is not the right approach." — Participant 002
28	Alternative strategies for surgical care delivery	"So, typically, if I met a patient, I would do their surgery and follow through with them. What we had to do was decouple that because we just had much more limited OR time. And so, we wanted to prioritize within our group, the patients, not just within our individual practices." — Participants 006
29	Alternative strategies for surgical care delivery	"I think there are some higher ups that are thinking outside the box, whether it be using private surgical centres to catch up on elective cases. Funding these cases outside the hospital setting makes a whole lot of sense in my mind." — Participant 005

Note: ENT = ears, nose and throat specialist; OR = operating room.

(because of illness or work-related stress) and increased patient volume owing to patients presenting with more advanced disease, leading to previously nonurgent surgeries requiring urgent interventions.

Some surgeons described a sentiment of divisiveness and tension between colleagues within their own discipline and across surgical services, where some nonurgent surgeries were delayed and more urgent surgeries (i.e., cancer surgeries) were continued (Q18 and Q19).

### Personal impact

Many surgeons described the personal impact of delaying nonurgent surgeries and of the COVID-19 pandemic more broadly, which was complex and intertwined with their professional lives. Surgeons described changes to income and their work-life balance, reporting notable financial consequences from reduced surgical cases within a fee-for-service reimbursement model in Alberta (Q20).

Like the public, surgeons were also personally affected by having to abide by public health measures (Q21). Surgeons did not describe the impact of surgical delays and the COVID-19 pandemic on caring for their school-aged children without school; however, the effect on work-life balance was noted by several surgeons. Whereas some reported a loss of work-life balance due to increased work-related demands and concern about developing burnout with the accumulation of surgical backlog (Q22), others described how the reduction in time devoted to their professional career provided an opportunity for a practice change and greater focus on work-life balance (Q23).

### Pragmatic adaptation to health system strain

Surgeons were adaptive and empathetic to the health system strain they experienced, which changed the way in which they delivered care (e.g., virtual appointments) to reduce the impact of nonurgent surgical delays.

All surgeons understood the need and rationale behind delaying nonurgent surgeries and expressed acceptance and empathy toward the difficult choices required by local decision-makers. Surgeons were pragmatic in the way they adapted to delivering care during surgical delays, describing ways in which they changed the delivery of patient care to best support patients during periods of high COVID-19 hospitalizations (e.g., completing more procedures in clinic) (Q24). There were additional changes in communication modalities with patients, with surgeons leveraging telehealth strategies and virtual follow-up with patients (Q25 and Q26).

Surgeons suggested strategies to mitigate some of the challenges experienced due to surgical delays. These strategies included enabling more opportunities for shared decision-making between surgical services, with stakeholder input around patient care decisions, to better identify appropriate patients at least risk of negative consequences from experiencing a surgical delay (Q27). Other described strategies included decoupling of surgeons completing surgeries from their patients (i.e., team-based care or shared care), and surgeons reported feeling stressed having to adopt this approach under these conditions (Q28). Additional strategies included the administration of day surgeries in free-standing facilities through alternative care models, and capacity building through extended hours for nonurgent surgical scheduling (Q29).

Figure 2 provides a summary of surgeon-generated strategies to mitigate some of the challenges of surgical delays, address surgical backlog and avoid future delays.

### Interpretation

This qualitative study describes how surgeons were affected by delays in nonurgent surgeries due to strained hospital capacity during the COVID-19 pandemic. Surgeons described their own experiences during the pandemic as well as their perceptions of the impact of the pandemic on the health system and surgical services. Our results suggest that both adult and pediatric surgeons across multiple specialties experienced health system, professional and personal impacts due to these delays. Surgeons described how nonurgent surgical delays exposed pre-existing issues (i.e., long surgical wait-lists and baseline high hospital occupancy) related to the ability of the health system to meet the demand for surgical care that became more apparent as a result of the pandemic.

The COVID-19 pandemic changed the way nonurgent surgeries were prioritized owing to strained clinical and infrastructural demands on health systems resulting from the influx of patients with COVID-19,<sup>25</sup> challenging health systems to determine how to best navigate the delivery of surgeries.<sup>1,2,26,27</sup> Several surgical societies developed guidelines on surgical prioritization during periods of scarce hospital resources.<sup>1,2,27</sup> However, there is little guidance available on how to address surgical backlogs after periods of high strain on hospital resources. Previous studies evaluating initiatives

to reduce wait times for nonurgent surgery in Canada have suggested using single-entry models, which generate a single queue directing patients to the next available surgeon, as a means to increase availability of services, reduce the number of patients placed on wait-lists and optimize health system performance (i.e., wait time monitoring and set performance targets).<sup>6,28,29</sup> The use of team-based approaches to patient care, in which patients are matched to the next available surgeon, was suggested by our participants and has been explored in the literature as a quality improvement initiative. In a study in which a team-based surgical scheduling approach was used to schedule patients with head and neck cancers, surgical groups were better equipped to maintain high utilization of blocked operating room times while maintaining patient and surgeon satisfaction. Patients were open to and interested in being assigned to the next available surgeon to reduce their waiting period, and this may be a feasible approach to surgical care that additionally enhances equity, standardization and reliability of care among patients and surgeons.<sup>30</sup> When examined in the Canadian context, Ontario health system leaders felt that this model could improve quality and reduce scheduling variability when designed to address local needs.<sup>31</sup> Our findings additionally suggest advocacy for additional funding, service expansion (e.g., extended and weekend operating times) and considerations for outsourcing (i.e., free-standing health centres) as further short-term and long-term strategies to address this backlog, and to generate sustainability to address pre-existing structural problems in surgical care delivery in Canadian

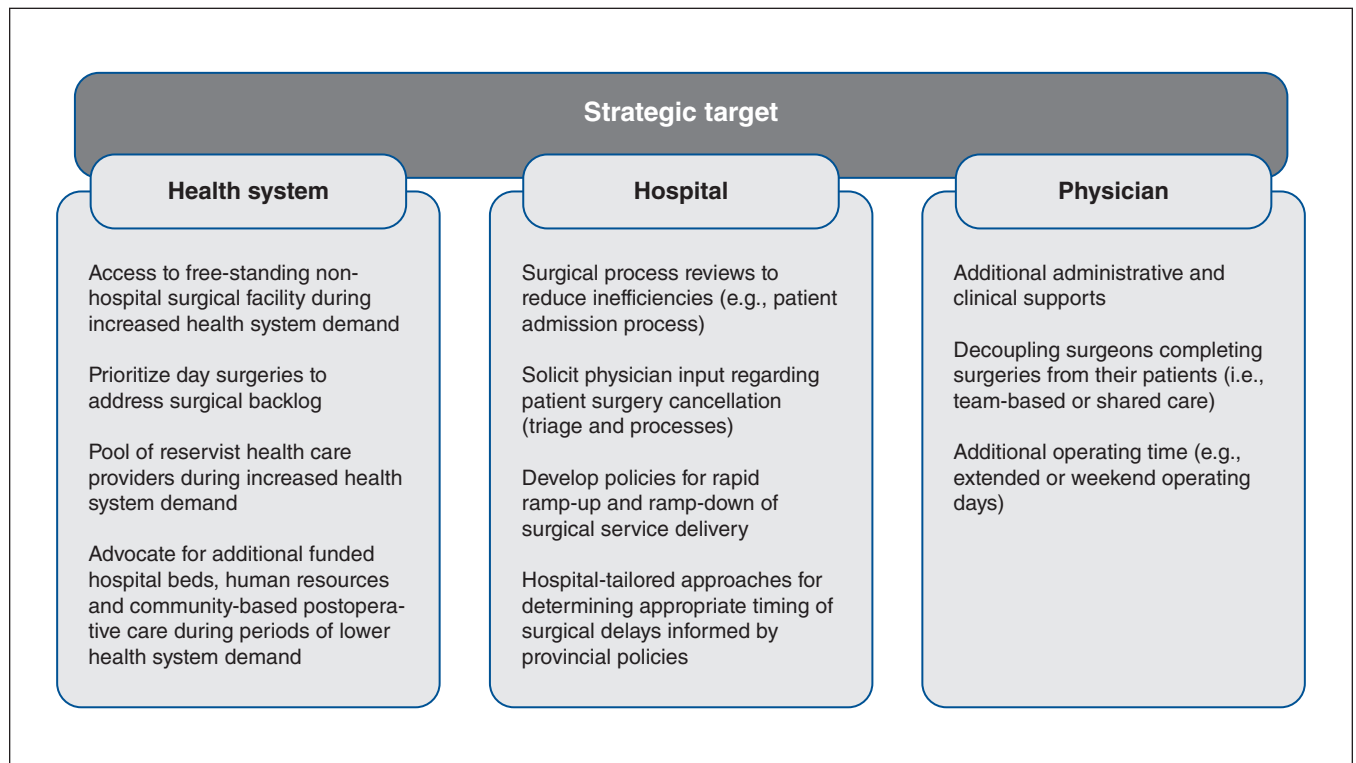


Figure 2: Participants identified 3 strategic targets to mitigate the impact of delaying nonurgent surgeries.



health care systems.<sup>6,28,32</sup> Long-term strategies must additionally address patient-centred health system performance to optimize operating room efficiencies, administrative efficiencies and patient care pathways to have sustained benefit on surgical wait times and backlogs in order to address the underlying pre-existing issues with surgical delays that have been exacerbated by the COVID-19 pandemic.<sup>6,28</sup>

Recent studies evaluating surgeons' experiences during the COVID-19 pandemic highlight both positive and negative consequences related to delays of nonurgent surgery. Similar to our study, surgeons expressed concern regarding the financial impacts of surgical delays.<sup>33</sup> Conversely, other studies have highlighted the benefits of the implementation of telemedicine and additional focus on wellness that happened as a result of delays of nonurgent surgeries.<sup>34,35</sup> Our study suggests that any interventions to reduce surgical wait times must engage surgeons and include supportive strategies to avoid ongoing professional and personal impacts from sustained high-volume demand for surgical care. Health care providers have experienced both physical and psychological risk throughout the COVID-19 pandemic, and the risk of burnout among surgeons has been well documented even before the pandemic.<sup>14-17</sup> Addressing modifiable risk factors for surgeon burnout (e.g., equitable workload among surgeons and financial compensation) during these periods of unpredictable workloads will be important to address surgical backlog from the COVID-19 pandemic.<sup>15</sup>

There are several strengths to this study. The inclusion of surgeons from multiple surgical specialties provided diverse perspectives and experiences. A multidisciplinary team of researchers and clinicians generated the interview guide, and 1-on-1 interviews were completed to foster psychological safety and depth to participant answers.

### Limitations

This study also has limitations. The context within which the study was conducted needs to be considered for transferability. The study was conducted in Alberta in January to March 2022, which was just after a surge of COVID-19 cases resulting in high demand for hospital care, which further resulted in the decision to delay nonurgent surgeries. This may hamper the transferability of our findings to other provinces that had a different experience with COVID-19 surges and that did not make the decision to delay nonurgent surgeries. Similarly, this study's participants were all surgeons within academic tertiary care centres, so it is possible that themes may not be transferable to surgeons working in community hospitals. Also, by using a convenience sampling approach to recruit participants, transferability of our results may be limited, as those individuals who agreed to participate may have had different opinions and experiences from those who did not participate in our study.

We were unable to analyze our results by age or gender owing to the use of convenience sampling, as these factors were not used to guide sampling leading to sample heterogeneity. Additionally, the impact of the COVID-19 pandemic on surgeons' personal (i.e., family situation and stability, and age) and work life (i.e., training and position) and their performance (i.e., ability to physically complete surgeries) was not

identified as a major theme by our participants. However, this may represent an important factor affecting surgeons' experiences of surgical delays.

Although 2 participants had additional roles as health care administrators, the perspectives represented in this study are limited to that of surgeons, which is one of many perspectives related to delayed surgeries during the COVID-19 pandemic. We have previously reported on the patient perspective of having nonurgent surgeries delayed<sup>24</sup> and are completing an environmental scan of policy changes across Canada, which includes the perspectives of policy-makers and administrators, but that is beyond the scope of the current study.

### Conclusion

Delaying nonurgent surgeries was necessary because of increased demand for hospital resources to care for patients with COVID-19, but surgeons experienced professional and personal impacts due to surgical delays, changing the way they were able to deliver care to their patients. Personal and infrastructural supports for surgeons are needed as they work to address the backlog of nonurgent surgeries.

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