Innovating for Value-Based Surgical Care in Canada: A Post-Pandemic Necessity

Innover pour des soins chirurgicaux axés sur la valeur au Canada : une nécessité post-pandémique

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Abstract

Providing high-quality, efficient and cost-effective surgical care to Canadians has become increasingly challenging since the pandemic, resulting in long waitlists due to limited staff and resources. The pandemic has facilitated some areas of innovation in surgical care, notably in virtual care and expedited discharge, although many challenges remain. Key policy recommendations for reform include investing in infrastructure to collect and report on value-based metrics beyond volume, devising strategies to improve health equity, enhancing out-of-hospital support for surgical patients by using remote monitoring and digital technology, increasing patient segmentation into low- and high-complexity pathways, centralizing surgical triage and initiating careful financial incentivization of integrated groups of clinicians.

Résumé

Il est de plus en plus difficile, depuis la pandémie, de fournir aux Canadiens des soins chirurgicaux de haute qualité, efficaces et rentables, comme en témoignent les longues listes d'attente, en raison du manque de personnel et des ressources limitées. La pandémie a facilité certains domaines d'innovation dans les soins chirurgicaux, notamment les soins virtuels et la sortie accélérée, bien que de nombreux défis subsistent. Les principales recommandations politiques pour la réforme comprennent l'investissement dans l'infrastructure pour collecter et rapporter des mesures fondées sur la valeur au-delà du volume, la conception de stratégies pour améliorer l'équité en matière de santé, l'amélioration du soutien en soins externes pour les patients opérés au moyen d'une surveillance à distance et des technologies numériques, l'augmentation de la segmentation des patients en voies de complexité faible ou élevée, la centralisation du triage chirurgical et la mise en place d'incitations financières prudentes pour les groupes intégrés de cliniciens.

Introduction

Providing high-quality, efficient and cost-effective surgical care to Canadians has become increasingly challenging. All aspects of the surgical trajectory are strained, from referral to recovery, and have created an urgent need for reform toward value-based care. Even before the pandemic, we saw increased emphasis being placed on longer-term, patient-centred outcomes (Wijeysundera and Johnson 2016). Surgery represents a substantial component of healthcare costs, with over two million surgeries performed every year in Canada at a cost of nearly $60 million in 2021 (CIHI 2021). Value must incorporate both the measurable change in patient outcome and the cost required for this care (Porter 2010), although the measurement of value is complex and currently rarely done for surgical care in Canada.

The 2021 Commonwealth Fund Report ranked the Canadian healthcare system second to last among high-income countries, sitting only above the US (Schneider et al. 2021). Canada performed particularly poorly on access to care, equity and healthcare outcomes, and many Canadians have previously reported difficulty accessing surgical care specifically

(Sommer et al. 2020). Despite long delays to accessing surgical care, the British Columbia Court of Appeal recently upheld a decision concluding that provisions of the *Medicare Protection Act* (1996) are not unconstitutional by disallowing private medical care (*Cambie Surgeries Corporation v. British Columbia 2022*). As a result, publicly funded healthcare will remain the primary provider of surgical care in Canada for the foreseeable future and must respond to these challenges.

The strain on surgical care worsened during the COVID-19 pandemic for several reasons but largely through exacerbation of pre-existing issues. Elective (scheduled) surgery was repeatedly delayed to increase critical care capacity, which, in turn, worsened pre-existing waitlists, including those for cancer and cardiac surgery. In addition, an "acute on chronic" shortage of healthcare workers further reduced surgical capacity. As a result, many emergency departments and operating rooms in Canada are currently unable to operate at full capacity. After several up and down cycles of ramping elective surgeries, we have not yet caught up to baseline pre-pandemic levels (Fu et al. 2022), let alone address backlogs. The consequences of these reductions are significant, with a nearly two-fold increase in mortality reported for patients awaiting cardiac procedures (Tam et al. 2021) and a projected reduction in long-term survival for those requiring cancer surgery during the pandemic (Parmar et al. 2022).

As surgical services experienced unprecedented pressures, the pandemic also served to facilitate innovation in surgical care. In this article, we explore examples of accelerated innovation during the pandemic, identify ongoing threats to high-value surgical care and provide policy recommendations going forward.

Surgical Care Innovation during the Pandemic

One of the most striking innovations to patient care was the implementation of virtual care at the onset of the pandemic. During earlier tentative attempts at virtual care, regulatory and technological hurdles were perceived as difficult to overcome; the attempts were further disincentivized by the limitations and conditions of the virtual fee codes available for physician compensation. Due to the pandemic, surgery and anaesthesiology clinics quickly adopted *good enough* technologies by using either phone or video consultation to avoid in-person visits. Simultaneously, provincial governments implemented new fee codes and regulatory amendments to allow virtual care (Health Services Branch, Ministry of Health 2020). After an initial learning curve, virtual care proved effective and convenient – associated with reduced travel time – particularly for those in remote areas, and demonstrated high patient satisfaction in both surgical and anaesthesiology clinics (McMaster et al. 2023; Wienhold et al. 2021). Limitations were also noted, such as lack of infrastructure (e.g., software, audiovisual equipment), lack of technical support, electronic security issues, poor usability, inability to perform physical examinations and lack of access to preoperative materials (Davenport et al. 2022; McMaster et al. 2023). In addition, the value of telehealth was not universally realized

as illustrated by the barriers faced by patients experiencing language, hearing or visual impairment and those without robust Internet access. Given high patient acceptability, perioperative virtual consultations should continue going forward, albeit with careful patient selection for in-person visits by clinic staff using pre-specified criteria and patient preference. Finally, surgical programs should continuously monitor safety endpoints, such as cancellations on the same day of surgery because of inadequate assessment or miscommunication. Overall, further research into the relative merits and appropriate application of virtual care in the perioperative period is required.

The other process innovation was expedited discharge after surgery, including conversion of in-patient to outpatient surgery. This shift was already under way and accelerated during the pandemic given the pressure on hospital capacity and patients' desire to avoid hospital stays. For example, same-day discharge after joint replacement or transfemoral aortic valve replacement was successfully implemented at some sites without causing an increase in readmission (Barker et al. 2022; Cherry et al. 2021). In patients undergoing breast cancer surgery, a combination of team-based care, centralized triage and conversion to regional anaesthesia allowed a significant increase in same-day discharge (Cadili et al. 2021). These examples of process innovation had several commonalities: multidisciplinary input, careful patient selection, increased efficiency and standardization and greater willingness to change due to pandemic disruptions and resource scarcity. Across the examples above, value increased because of maintained or improved patient outcomes, reduced cost from shorter stays or both (Barker et al. 2022; Cadili et al. 2021; Cherry et al. 2021).

Remaining Gaps in Surgical Care in Canada

Many issues remain, including the fact that the concept of value of surgical care in Canada is not fully defined and largely unmeasured. Value is typically defined by providers and focuses on metrics such as mortality because these outcomes are more easily captured and perceived as priority. However, provider priorities may differ and often do not incorporate patients' priorities for their health, such as symptom burden and quality of life (Guan et al. 2020). In addition, most health systems lack infrastructure to routinely capture patient-reported outcomes, vastly limiting our ability to implement strategies to improve value.

Other issues include lack of coordination across healthcare sectors and regions, geographical challenges and health inequities. Access to surgical care requires referral from a primary care physician, yet an increasing number of Canadians do not have access to a family doctor (Esler 2022). The escalating primary care crisis contributes to chaotic and fragmented care before and after surgery, with sometimes inefficient and confusing referral pathways. For example, an unattached patient may miss routine screening visits and present for surgery with more advanced cancer or poorly controlled comorbid conditions, both of which increase perioperative risks. In addition, expedited discharge can shift acute recovery into the home, such as wound care and pain and symptom management, yet patient-centred infrastructure

to support patients during recovery is lagging. Surgical care reform will not be effective without cross-sector coordination with community resources both before and after the acute hospital episode. The unique challenges of providing specialized surgical care across a large, geographically diverse country such as Canada means many patients must travel far from home to access these services and face barriers to follow-up. Finally, and most critically, inequity in access and surgical outcome disparities for Indigenous Peoples (McVicar et al. 2021), women (Wallis et al. 2022), Black patients (Azin et al. 2020) and other groups experiencing marginalization have been preliminarily identified, but metrics on equity in surgical access and outcomes for these groups remain largely uncaptured and the issues, unaddressed.

Going Forward: Recommendations for Surgical Care Policy

Provinces and territories face considerable challenges in the face of long waitlists and limited resources. Our recommendations for surgical health policy going forward are as follows, in the order of importance.

Invest in infrastructure to measure value in surgical care transparently and consistently

This recommendation is neither new nor unique but remains unheeded by many provinces and the federal government, resulting in a lack of accountability. The most widely used metric by the provincial health systems is surgical volume, which provides some measure of system efficiency and aligns well with the fee-for-service reimbursement model used by most physicians. However, volume alone does not provide a complete picture of value and does not incorporate patient perspective or health equity. To better measure value, Wodchis (2019) proposed the following simplified principles: (1) direct patient input – for example, patient-reported outcomes and experience measures; (2) process measures that incorporate the values of healthcare providers, organizational quality and operational efficiency; and (3) population measures of equity and distributive efficiency. In practical terms, provinces can mandate reporting of value-based metrics by hospitals, which will require regional or provincial health authorities to invest in infrastructure (staff, survey platforms, analysts) to provide timely perioperative patient-reported measures in addition to traditional metrics such as length of stay. These data should incorporate equity metrics, identify areas for improvement and evaluate interventions. Provinces should hold health authorities accountable for gaps in equity to drive change.

Process measures should seek to evaluate not just traditional outcomes (case volume, adherence to standards and resource consumption) but also the level of stress in accessing treatment (Wallace and Teisberg 2016). The Canadian health system has largely de-prioritized the patient experience in surgical care, with long wait times, frequent last-minute case cancellations, fragmented communication and unsupported transitions from hospital to home. Although cost is an important part of the value equation – efficiency, rather than care

rationing, should be the focus (Teisberg et al. 2020). Taken together, these metrics can also be used to facilitate the administration of rewards for high performance (or penalties for low performance).

In selected populations, provinces can also sample outcome data for patients seeking non-operative management options to determine the overall efficacy of surgical intervention in the context of shared decision making. For example, a recent study of frail, institutionalized patients with hip fracture showed that non-operative management resulted in non-inferior quality of life as assessed by proxies and caregivers and shorter length of hospital stay (Loggers et al. 2022). Although the 30-day mortality rate was high (greater than 80%), proxies in the non-operative group reported greater satisfaction with the quality of dying and death compared with those in the operative group. Because healthcare providers have identified time and resource constraints as barriers to shared decision making (Spronk et al. 2022), hospitals can provide tools, implement pathways and support patients in exploring non-operative interventions at a local level.

Address equity gaps in surgical care

Disparities in access and outcomes following surgery have become more visible during the pandemic (Urbach and Martin 2020), and health disparities represent an urgent and complex problem. Although these issues are complex, identifying the underlying reasons and corrective strategies must be urgently prioritized. The stress inflicted by the pandemic highlighted the need to build a resilient healthcare system that can respond to uncertainty and change in an equitable way. Change should be data-driven and informed by appropriate metrics routinely collected by the provinces and territories. The Canadian Institute for Health Information (CIHI) recently released guidance on the collection and reporting of race-based and Indigenous identity data in order to harmonize collection and ensure that high-quality data are comparable across jurisdictions (CIHI 2022). An intentional and culturally safe strategy for collection of equity-related metrics is important to avoid survey non-response bias in already marginalized groups. These data will create accountability and help avoid policy creation based on assumptions. Surgical waitlists, case cancellations and access to data by patient race, ethnicity, gender and geography should be tracked, in addition to post-operative outcomes, and these can be used to develop and evaluate policy changes. An example of this concept is illustrated by the policy changes to the US Kidney Allocation System in 2014 to address identified racial disparities in kidney transplantation (Melanson et al. 2017). The primary reform was to revise the priority criteria from wait time on the transplant list to also include time spent on dialysis, resulting in a reduction in transplant disparities for Black and Hispanic patients given the presence of disparities in time to referral (Melanson et al. 2017). In contrast, Canada does not collect key demographics such as race in its large CIHI databases, making similar analyses and interventions very challenging.

Research in surgical health equity should be prioritized by universities and funding agencies to identify ongoing disparities and solutions. Critically, value-based incentives should be carefully applied to avoid penalizing institutions that disproportionately care for marginalized individuals who require more complex care, and instead consider rewarding relative improvements and stratifying benchmarks and incentive pools (Navathe and Liao 2022). Mandatory education in the principles of health equity is increasingly being adopted at medical schools across Canada, and additional education and diverse healthcare leadership are essential to ensure policy decisions are made with an equity lens.

Enhance patient support before and after surgery using virtual care and digital health

Patients generally receive high-quality care in Canadian hospitals but often lack support, including pain and symptom management and mental health support, during long waits before surgery and after discharge from hospital. Patients travelling long distances for surgical care in Canada can also benefit from remote monitoring and virtual care follow-up. Despite the best efforts of healthcare professionals, overcoming systemic barriers is challenging. Digital health approaches representing innovative and cost-effective solutions to bridge these gaps in care are now more accessible and acceptable to patients than ever before (McMaster et al. 2023). Patient engagement technology after colorectal surgery has been shown to facilitate discharge, prevent readmission and reduce costs (Gleason et al. 2022). A digital pain management application demonstrated high engagement with patients from both urban and rural settings in Ontario, and may improve patient-reported outcomes (Bhatia et al. 2021). Digital health infrastructure can also support the collection of patient-reported outcomes needed for value measurement. Health authorities should be responsible for providing access to technology that can be customized by individual programs and groups, likely through partnerships with digital health companies.

Increase patient segmentation and resource centralization

Today's operating rooms typically encompass a spectrum of case acuity, complexity and hospital volume. Some institutions focus more on low-acuity, rapid discharge procedures, while others offer expertise in caring for complex patients and procedures. Although many hospitals attempt to segregate these groups of patients, the process is incomplete and these two streams commonly co-exist within one institution, mixing low- and high-risk patients and procedures. Using Christensen's model of innovation, hospitals or surgical centres can be separated into *solution shops* and *value-adding processes* (VAPs) (Christensen et al. 2017). Solution shops are structured to diagnose and treat unstructured medical issues and provide personalized care plans to complex patients with high variability in outcome and resource consumption. These surgical systems create value in their expertise, adaptability and scalable resources rather than efficiency. Examples include tertiary hospitals providing a high volume of lengthy, complex

cancer surgeries or designated transplant centres. In contrast, VAP models focus on patients with definitive diagnoses and predictably low variation in outcome. These centres create value in their process innovation for efficiency, consistency and cost-reduction. For example, a low-risk, rapid-turnover eye surgery often takes place at specialized centres that exclusively focus on a narrow range of procedures and benefit from an efficient, refined pathway from patient entry to discharge. Christensen et al. (2017) argue that these models are difficult to effectively innovate together under the same roof, yet these models are conflated throughout operating rooms in Canada. Large operating rooms focusing on high volumes of complex patients and procedures can rarely achieve the efficiency of smaller, lower acuity centres, but may produce better outcomes for patients with the most complex issues (McIsaac et al. 2017).

Segmentation gains several advantages by promoting greater standardization of high-quality care and lower variability between providers for straightforward cases as seen by the shift toward expedited discharge during the pandemic for selected patients. Regionalization of complex patients or high-acuity procedures to designated centres also increases hospital volume, which is associated with improved outcomes for complex surgery and for frail patients (Hallet et al. 2021; McIsaac et al. 2017). Even within a complex population, segmentation can allow process innovation. For example, stratification of cardiac surgery patients into high- and low-risk pathways led to reduced length of stay, resource consumption and cost (Cook et al. 2014), and these "pathways" are now commonly used in many cardiac surgical centres. Many hospitals, including those in remote areas, must provide a spectrum of surgical care in a single centre; however, innovation can occur by segregation of specialized lists and can serve as a local prototype. This concept is illustrated by one centre's use of a standardized regional anaesthesia pathway in a parallel orthopaedic surgery "swing" operating room to increase surgical case volume by over 50% (Head et al. 2011). However, smaller centres should avoid taking on infrequent, highly complex elective procedures when possible, given the evidence of better outcomes at high-volume centres (Hallet et al. 2021). Hospitals should develop triage mechanisms and designated pathways for both types of patients collaboratively and iteratively by involving all stakeholders, including patients, families/caregivers, surgeons, anesthesiologists, nurses and other allied professionals. On a higher level, regional and provincial health systems should continue to refine efficient referral pathways to regional surgical centres for complex surgery.

Re-evaluate surgical triage strategy

Medical urgency is often used to determine surgical priority when triaging both elective and emergent cases during instances of resource scarcity. With increasing scarcity, triage considerations have become more acute and difficult. Long waits have a substantial impact on patients, causing deterioration of function and mental health (Guo et al. 2022) and reducing outcome gains for patients. While acutely life-threatening emergencies should still take precedence, we must now re-evaluate surgical prioritization and waitlist management along

the full spectrum of both urgent and non-urgent surgery. As advocated by others (Urbach and Martin 2020; Wiebe et al. 2022), central referral pathways to groups of surgeons with similar expertise can increase efficiency and equity, and facilitate tracking of metrics. The creation of such pathways is optimally done in full collaboration with surgeons, given the nuances of specialization and expertise. For example, common and uncomplicated surgical procedures can be optimally shared among groups of surgeons who possess broad expertise, while other less common procedures requiring additional expertise (e.g., complex cancer surgery) may benefit from directed referral. Financial incentives, infrastructure support and easier access to surgical resources can facilitate creation of necessary physician networks.

These waitlist strategies can build upon previous research on waitlist management that identified value-based tools such as priority scores developed through the Western Canada Waiting List Project (De Coster et al. 2007). However, prioritization strategies must also avoid introducing unnecessary complexity, which can waste resources (Kreindler 2008). In addition, provinces should provide parallel capacity for both non-urgent surgery and urgent surgery to avoid repeated cancellation of some "elective" surgeries for conditions with substantial impact on function and which can result in alternative healthcare resource consumption (e.g., the emergency department) and diminishing value. Joint replacement, rectal prolapse repair and deep brain stimulator insertion are examples of elective procedures that can have a major impact on quality of life, promote function and mitigate chronic resource consumption (Mäkelä-Kaikkonen et al. 2019; Perestelo-Pérez et al. 2014; Quintana et al. 2006). Although controversial, publicly funded private surgical centres continue to provide dedicated capacity for non-urgent, lower complexity, short-stay surgery and have already been a key part of addressing backlogs in Canada – health authorities contracted $27.2 million to private clinics in British Columbia in 2021 alone (Longhurst 2022). Until the provincial health ministries are willing to establish similar, publicly run, dedicated surgical centres distinct from full-service hospitals, private surgical centres will likely continue to offer a viable avenue for low-complexity and outpatient surgery.

System-level incentivization of value-based care

Rewarding value in the Canadian healthcare system is challenging, given the difficulty in accurately measuring value with little accountability from providers or hospitals. Other contributors include a mix of payment models for different sectors and health professionals and lack of competition in a single-payer system. Financial incentives should be carefully considered as the current strategy of primarily rewarding volume in the fee-for-service payment model to physicians does little to encourage value-based care and is not aligned with a hospital's fixed budget for comprehensive services. As value "should encompass all services or activities that jointly determine success in meeting a set of patient needs" (Porter 2010: 2478), incentives should ideally be applied to integrated units of surgical providers that include the anesthesiologists, surgeons and the hospital; yet physician services, hospital costs

and out-of-hospital care are funded separately. Even the physicians involved are incentivized differently as surgeons are paid by case and anesthesiologists, by time. In the authors' experience, applying incentives to individual physicians based on sparsely collected, surrogate-quality metrics does little to incentivize behaviour. However, pure bundled payment models in the Canadian single-payer system are challenging due to disparate compensation models, lack of information sharing across groups and lack of appropriately adjusted value-based metrics (Golden and Hannam 2021). A better approach would be for provinces, together with provincial medical associations, to develop separate reward payments to linked groups of surgeons, anesthesiologists and hospitals for selected patient groups with established benchmarked outcomes (e.g., joint replacement or Caesarean section), and shift the focus away from individual physicians.

Pitt and Dossett (2022) recently advocated for the de-implementation of low-value care in surgery, including careful financial incentivization that includes eliminating unnecessary and costly investigations and interventions. For example, routine blood type and screening can safely be omitted for non-anemic patients undergoing joint arthroplasty (Nuñez et al. 2022), but is not universally adopted. The Choosing Wisely Canada campaign was a relatively successful intervention to educate and eliminate low-value care, including routine preoperative testing; however, implementation has been uneven (Bouck et al. 2019). Potential strategies to reduce low-value care further include clinical decision support tools embedded in electronic health records and publication of guidelines and best practices from societies and journals (Pitt and Dossett 2022). Hospitals and provincial medical associations are increasingly supporting physician time and training to lead multidisciplinary quality improvement projects and change management for best practices – activities that are not typically compensated. Provinces should establish stable funding to support these activities, which are otherwise disincentivized.

Role of the Federal Government

In Canada, the provinces and territories are largely responsible for administering healthcare after receiving transfers from the federal government. Given the discussion to date, is there a role for the federal government in surgical care reform? Our view is yes, the federal government could support the implementation of value-based surgical care in several ways. Building upon the Health Council of Canada's (2014) recommendations to develop comparable health indicators and increase public reporting of health information, the federal government can hold the provinces accountable to value-based metrics, incentivize reform financially and facilitate collaboration between the provinces and territories. At a federal level, mandated reporting of a more comprehensive set of equity-based metrics by the provinces is essential to monitor disparities and support equity initiatives. Finally, the federal government should support policy development on value-based surgical care.

Conclusion

Surgical care in Canada is under significant strain due to chronic issues exacerbated by the COVID-19 pandemic, creating an ideal opportunity to harness emergent innovation and drive further reform at all levels. We propose several recommendations to address these challenges, which must include reporting value-based metrics beyond volume, investing in strategies to improve health equity, enhancing out-of-hospital support for surgical patients using remote monitoring and digital technology, increasing patient segmentation into low- and high-complexity pathways, centralizing surgical triage and careful financial incentivization of integrated groups of clinicians.

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