

BMJ Open Secondary impacts of the COVID-19 pandemic at a tertiary children's hospital in Canada: a mixed-methods study

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ABSTRACT

Objectives Decisions to pause all non-essential paediatric hospital activities during the initial phase of the COVID-19 pandemic may have led to significant delays, deferrals and disruptions in medical care. This study explores clinical cases where the care of children was perceived by hospital clinicians to have been negatively impacted because of the changes in healthcare delivery attributing to the restrictions placed resulting from the COVID-19 pandemic.

Design and setting This study used a mixed-methods approach using the following: (1) a quantitative analysis of overall descriptive hospital activity between May and August 2020, and utilisation of data during the study period was performed, and (2) a qualitative multiple-case study design with descriptive thematic analysis of clinician-reported consequences of the COVID-19 pandemic on care provided at a tertiary children's hospital.

Results Hospital-level utilisation and activity patterns revealed a substantial change to hospital activity including an initial reduction in emergency department attendance by 38% and an increase in ambulatory virtual care from 4% before COVID-19 to 67% between May and August 2020. Two hundred and twelve clinicians reported a total of 116 unique cases. Themes including (1) timeliness of care, (2) disruption of patient-centred care, (3) new pressures in the provision of safe and efficient care and (4) inequity in the experience of the COVID-19 pandemic emerged, each impacting patients, their families and healthcare providers.

Conclusion Being aware of the breadth of the impact of the COVID-19 pandemic across all of the identified themes is important to enable the delivery of timely, safe, high-quality, family-centred paediatric care moving forward.

INTRODUCTION

Since the onset of the COVID-19 pandemic, much of society, including healthcare delivery, has changed.¹ Governments took measures to decrease transmission such as implementing school closures, halting of public events, lockdown measures and encouraging physical distancing and self-isolation.² The COVID-19

STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ This study demonstrates the breadth of COVID-19's impact on the delivery of timely, safe, equitable and patient and family-centred care, highlighting considerations for paediatric providers as we move forward.
- ⇒ The strengths of this study are the timeliness of clinical case identification after the onset of the COVID-19 pandemic at the peak of the pause of non-essential hospital activity.
- ⇒ Limitations of the study include that it represents the experience of one paediatric tertiary care hospital and may not be representative of other centres and that the case finding methodology used was not in real time and cannot provide a denominator or frequency for events.

pandemic increased the demand on hospital systems nationwide with structural and operational changes across hospital organisations including major reorganisation³ with non-essential activity including in-person outpatient and elective surgery activity curtailed. In addition, how children and their families accessed hospital-based care changed,⁴ as well as school and other community-based services.

The impact of such measures had a broader impact and clinical consequences, for example, delayed presentations and deferrals of care.^{5–10} This led to a call for urgent monitoring and the importance of systematically collected data regarding the impact of such measures.^{11–13} However, there is limited research on clinical case data on morbidity, mortality and secondary consequences of the COVID-19 pandemic from a clinician's perspective.

This study's primary objective was to describe courses of care for hospitalised



children that were altered by the COVID-19 pandemic from the clinician's perspective. Our secondary objective was to identify thematic similarities to inform clinical practice and explore the associated negative effects of healthcare and hospital policy changes associated with the COVID-19 pandemic.

METHODS

Design, setting, sample and data

This mixed-methods study was performed at The Hospital for Sick Children, a 350-bed tertiary care children's hospital in Toronto, Canada, and describes the experience between March and August 2020, which coincides with the first wave of the COVID-19 pandemic in Canada.¹⁴ The study was managed using the Research Electronic Data Capture (REDCap) platform. REDCap is a secure,¹⁵ web-based software platform designed to support data capture for research studies.^{16 17} A quantitative review of hospital data was also performed to understand and contextualise patterns of clinical activity changes during the study period. A brief interim report, completed mid-way through the study, was previously published.¹⁸ We disseminated early results in real time to inform healthcare leaders and decision-makers about the breadth of the impact associated with the COVID-19 pandemic.

Measures of variables

Case series

Cases were identified in two ways in order to facilitate comprehensive capture: (1) a prospective biweekly email survey, and (2) monthly review of clinical cases submitted for morbidity and mortality (M+M) review hospital-wide. The review of cases submitted as part of the M+M process was intended to enhance the comprehensiveness of data. An e-version consent form was completed by all participants prior to completing the survey.

Clinician reporting

A biweekly survey was sent to all physicians (including trainees), dentists and advanced practice nurses (n=1727) from 25 May to 25 August 2020. The survey included demographic information as well as case identification questions. They were asked to identify any patients they perceived to have experienced a suboptimal quality of care or health outcome related to changes that had occurred as a result of the COVID-19 pandemic, including their perception of the impact (online supplemental table 1).

Individuals could complete the survey on more than one occasion if they experienced other cases that met the criteria.

M+M records

Two reviewers considered written reports of hospital-wide M+M meetings until 31 December 2020 to identify any additional cases that listed the COVID-19 pandemic as contributing to the reported morbidity. New cases that

were identified within the M+M reporting structure (ie, those not already identified by clinicians) were included in the same database as those identified by the clinician survey and subsequent case study analysis.

Data analysis procedures

The Standards for Reporting Qualitative Research reporting guidelines were used.¹⁹

1. Case study analysis followed a qualitative case series methodology using a narrative synthesis approach to determine similarities and associated themes.²⁰ Data were extracted from the hospital record for all reported clinical cases (online supplemental table 2) focusing on the morbidity experienced. Three independent research team members (TA, CD and JO) undertook the thematic analysis. This involved (1) data familiarisation, (2) data coding, (3) consideration of themes, (4) revision of themes and (5) analysis of individual themes.²¹ A pattern that emerged from the data set as key to understanding the study question was identified as a theme.²¹ Several overarching themes emerged, and data were grouped into clusters to characterise and situate the data.²⁰ Themes were reviewed and defined such that the analytical narrative and data extracts are weaved together and contextualised within real-life context, within the existing literature. When reviewers disagreed, cases were discussed including a review of objective evidence, until a consensus was reached. Some cases reflected multiple themes.
2. Hospital utilisation and clinical activity. Using the institutions' decision support analytics, hospital activity data were obtained to understand changes in clinical care activity, including presentations to the emergency department (ED), hospital admissions, surgeries and radiological tests. Hospital activity data were compared between March–August 2019 and March–August 2020.

Patient and public involvement

There was no involvement of patients and the public in this study.

RESULTS

Case series

Survey participants

Two hundred and twelve clinicians from all hospital departments (paediatrics, perioperative services, diagnostic imaging, psychiatry and laboratory medicine) completed at least one survey during the study period (table 1). Twenty clinical subspecialties within the department of paediatrics and 10 in perioperative services were included. One hundred and sixteen cases were reported (some respondents completed the survey and did not report a case). Four cases were previously reported, and nine cases did not have sufficient detail to guide a case review. One case reported as a delayed acute presentation was excluded, as on review, symptoms were present for less than 24 hours. A review of M+M data identified

Table 1 Clinician demographics*

Characteristic	n	%
Participant		
Full-time physician	133	63
Trainee	47	22
Advanced practice nurse	32	15
Years in practice		
<5	56	27
5–10	37	17
10–30	93	44
>30	26	12
Departments		
Paediatrics	146	69
Perioperative services	51	24
Diagnostic imaging	4	2
Psychiatry	4	2
Laboratory medicine	4	2
Not provided	3	1

*Data collected from 25 May to 25 August 2020 from Toronto, Ontario, Canada.

three cases where the pandemic was listed as a contributory factor, two of which were already reported by survey respondents.

Thematic analysis

Several broad themes emerged, including (1) timeliness of care, (2) disruption of patient-centred care, (3) inequity in the experience of the COVID-19 pandemic and (4) new pressures in the provision of safe and efficient care. Within each of these themes, subthemes emerged, highlighting the impact on (1) patients, (2) their families and (3) healthcare providers. We have collated all results and examples in [table 2](#).

Timeliness of care (68 cases)

Clinicians reported that secondary to the COVID-19 pandemic, delayed acute presentation (n=24), postponement of scheduled procedures (n=22), caregiver cancellation of ambulatory clinical appointments (n=13) and disruption of community care (n=9) impacted the care of their patients.

Disruption to the delivery of patient and family-centred care (18 cases)

Eighteen cases described the impact on the hospital or clinicians' ability to provide patient and family-centred care; nine related directly to the child's experience and nine to the family experience.

Equity (17 cases)

Seventeen cases described the COVID-19 mitigation strategies such as school closures and disruption to support services at the hospital further highlighting the inequity

in the experience of the pandemic, seven cases related to the family experience and 10 to the patient and family experience.

Safe and effective care (21 cases)

Seventeen clinician-reported challenges relating to safe and effective care such as difficulties establishing therapeutic relationships, challenges with complex discharge planning, issues with virtual care and difficulties in adapting to care provision in an environment of rapid change with new, frequently updated policies related to the COVID-19 pandemic.

Hospital activity (March to August 2020)

Attendance in the ED ([figure 1](#)) decreased by 39%, from 36 940 to 22 542 visits between March and August 2020 compared with the same period in 2019. The percentage of patients seen in the ED requiring admission increased from 10.5% to 15.3% during this period.

From April to August 2020, there was a 17% reduction in surgeries and 33% reduction in outpatient radiological investigations compared with the same period in 2019 ([figure 2](#)). The number of children awaiting surgical intervention in August 2020 had increased by 31% since the start of the COVID-19 pandemic. The pandemic triggered an increase in virtual care, particularly in ambulatory care. Virtual visits increased from 4% of all ambulatory visits before COVID-19 to 67% of all ambulatory visits in August 2020 ([figure 3](#)).

DISCUSSION

The study results explore the broad impact of the COVID-19 pandemic on paediatric hospital care from the perspective of a large group of clinicians. Delays in presentation for care during the pandemic, and the potential impact on morbidity, including hospitalisation and financial cost, have been previously described.^{22–24} Our hospital data confirm a drop in ED attendance as well as reductions in surgical and ambulatory activity, and a large switch to virtual care in the ambulatory setting. Our results illustrate that the impact of the COVID-19 pandemic extends beyond simply access to timely care to much broader health quality domains including patient-centredness, equity and safety. Our findings highlight three key areas of concern specifically relating to patient and family-centred care, the expansion of virtual care and care of vulnerable populations.

Family-centred care, a standard of care in many institutions caring for children, involves taking a partnered healthcare decision-making approach.²⁵ The provision of patient and family-centred care during the pandemic was challenged. The core tenant of shared decision-making was often limited due to policies in place including family presence at the bedside.²⁶ Particular situations, for example, when providing a new diagnosis, require careful consideration as family presence can support parental coping and mitigate decisional conflict.^{27 28}

Table 2 Results: disruption in care examples

	Number of cases (n=168)	Impact on children (as reported by clinicians)	Impact on families (as reported by clinicians)	Impact on clinicians (as reported by clinicians)
Timeliness of care	68	Fear of exposure to COVID-19 <ul style="list-style-type: none"> ▶ Delay in presentation (5-week history of dyspnoea and dysphagia) due to family reluctance to attend healthcare: delayed diagnosis with Burkitt's lymphoma. 	Change in the availability of services <ul style="list-style-type: none"> ▶ Adaptation in decision-making, for example, when to seek medical care. ▶ Increased caregiver burden, for example, deferral of orthopaedic care resulting in increased pain requiring referrals to chronic pain service. 	Change in workload <ul style="list-style-type: none"> ▶ Distress prioritising cases in ways they never had to do before. ▶ Ramp-up of clinical activity, for example, resumption of surgical activity, with many additional restrictions and policies, for example, infection control measures.
Disruption of patient-centred care	18	Infection control measures <ul style="list-style-type: none"> ▶ Children requiring multiple screening COVID-19 nasopharyngeal (NP) swabs. ▶ Visitor policy restrictions, for example, at the end of a child's life, when siblings and extended family were not present. 	Change in family supports <ul style="list-style-type: none"> ▶ Absence of both caregivers causing distress, for example, diagnosis disclosure with one parent present and another joining remotely. ▶ Closure of usual supports, for example, parental overnight accommodation. 	Moral distress <ul style="list-style-type: none"> ▶ Enforcing new measures, for example, screening for COVID-19 with multiple NP swabs. ▶ Witnessing family stress, for example, at end of life when family presence was limited.
Inequity in the experience of the COVID-19 pandemic	17	Disruption to services <ul style="list-style-type: none"> ▶ School closure for children with disabilities, contributing to skill regression. ▶ Services designed to ensure child well-being, for example, child protection services were limited in their ability to complete in-home visits. 	Adapting to change in supports <ul style="list-style-type: none"> ▶ Closure of day care, school and hospital child-minding services decreased the availability of family members because social distancing measures impacted the care of siblings resulting in deferral of care requests from families. 	Moral distress <ul style="list-style-type: none"> ▶ Limited ability to respond to witnessed inequities as families navigated diminished supports, for example, school closure increased caregiving burden on families and need for additional supports in home.
New pressures in the provision of safe and efficient care	21	Virtual care <ul style="list-style-type: none"> ▶ Challenges in virtual care delivery, for example, establishment of a therapeutic relationship with a young person with severe anxiety, identification of physical signs, for example, pleural effusion. 	Change in care delivery <ul style="list-style-type: none"> ▶ Delayed discharge home from hospital, for example, a child with multiple technology dependencies (ventilator dependent, tracheostomy, enterostomy feeds), due to lack of community home care supports, coupled with parental hesitancy to receive home care services related to the risk of COVID-19 exposure. ▶ Virtual care provision including, for example, providing laboratory requisitions without home printer. 	Change in care delivery <ul style="list-style-type: none"> ▶ Adjustment to use of PPE including new communication challenges, including inability to read non-verbal cues. ▶ Reduced gatherings on ward impacting team performance, for example, pharmacist's absence on the ward round reduced the opportunity to identify medication-related errors.

PPE, personal protective equipment.

Hospitals need to continue to learn from their growing experience of providing healthcare during a pandemic and balance policies to align with the best care, including family-centredness, an essential contributor to patient and family well-being.²⁹ Innovative interventions could support healthcare providers to engage with families, for example, using technology to support sibling involvement at the bedside.

Clinicians reported the challenges they encountered as they adapted to virtual care delivery in a rapidly changing environment, echoing previous experience that emphasised integrating virtual care with existing systems.³⁰ They were often unable to provide care as they previously did,

for example, not completing a physical examination or reduced ability to read non-verbal communication cues. This highlights that the delivery of virtual care requires a particular skill set on the part of the healthcare provider including decision-making about the appropriateness of virtual care.³¹

The expansion of virtual care is associated with benefit, possibly enhancing family and patient-centred care delivery. For example, virtual ambulatory care can reduce the frequency with which families have to travel and attend hospital, reducing the need for caregivers to take time off work and associated costs. Coordinating the involvement of multiple professionals in a clinical interaction

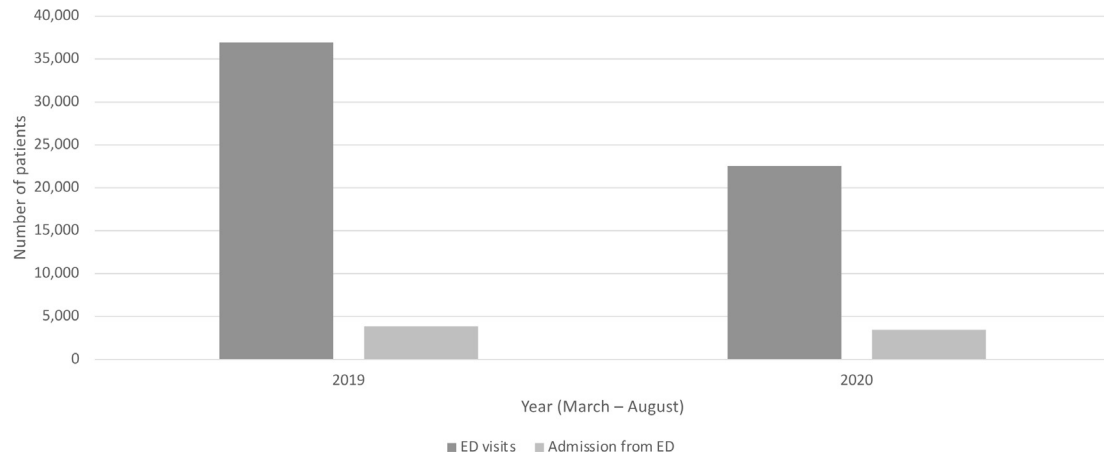


Figure 1 Emergency department (ED) activity at SickKids (March to August 2019 vs March to August 2020).

is potentially easier, with many able to join virtually. As a potentially valuable means to support patient-centred care, virtual care needs to be championed.³² However, as healthcare providers, we need to be aware that inequities in digital health exist alongside other factors contributing to poorer health outcomes such as poverty. Lack of access to technology or the expertise to navigate it can contribute to health inequities associated with increased age, lower level of educational attainment and lower socioeconomic status.³² Advances in virtual care need to be accompanied by a concerted effort to prevent disparities in care for patients without access to internet or devices³³ including alternatives for families unable to attend virtual appointments.

Our findings support previously published commentaries and research studies, highlighting subgroups of children as particularly vulnerable, including those with medical complexity, developmental disabilities and mental health diagnoses.^{34–37} As families continue to provide care to their children with additional needs during the pandemic³⁸ we need to consider children who are particularly vulnerable to its impact, for example, those who receive healthcare and therapy via the educational system. Clinicians must continue to advocate for

paid sick leave and other policies which support and facilitate family caregiver's interactions with healthcare.

Clinicians reported increasing moral distress and burnout throughout the COVID-19 pandemic.³⁹ Cases reported highlighted the challenges clinicians face as witnesses of the inequity within society and healthcare. In addition, clinicians themselves are also likely experiencing similar issues such as reduced childcare availability, school closures and sick loved ones, which was consistent with previous literature which has found that healthcare workers reported greater mental health concerns, adverse effects and inadequate supports during the pandemic.⁴⁰ It is important to remind leaders and managers in healthcare to be mindful of the burden that healthcare professionals are currently bearing, particularly as the pandemic stretches on. Understanding the link between clinicians, family and patient experience, the role of societal and institutional policies and actions undertaken at various levels in response to lived experience and policies is an important area of study, both to support healthcare workers and deliver family and patient-centred care.

Policy makers and paediatric hospital leaders need to take children's unique needs into consideration, and should include the perspectives of patients, families and

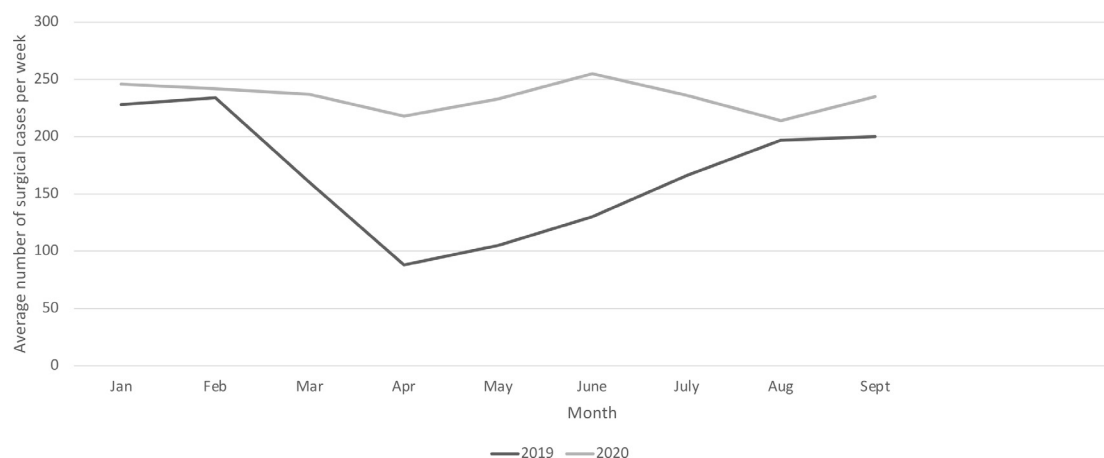


Figure 2 Surgical activity at SickKids (March to August 2019 versus March to August 2020).

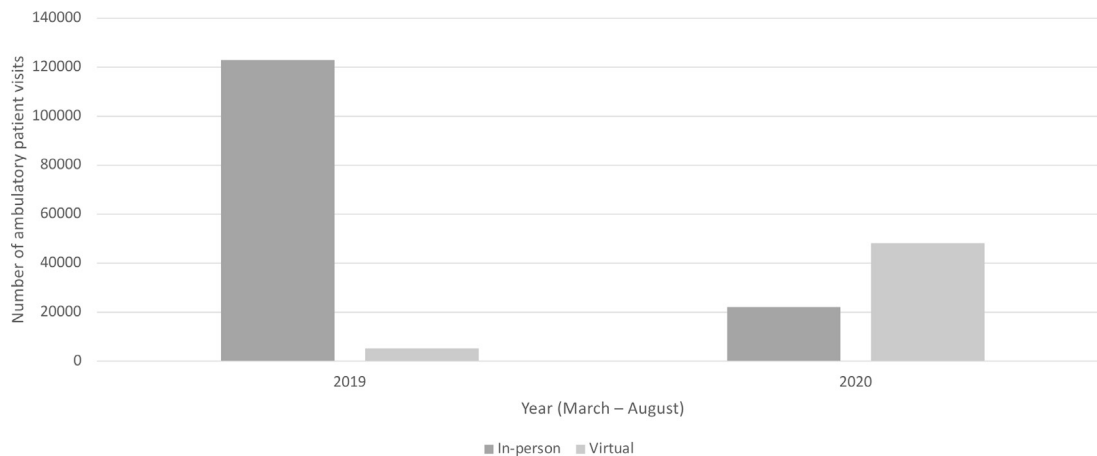


Figure 3 Ambulatory activity at SickKids (March to August 2019 vs March to August 2020).

healthcare professionals in disaster planning to ensure minimal disruptions in care.⁴¹ With regard to policy changes, previous studies have suggested that role of public governance is important to face pandemic crises in society.⁴² Strict measures such as lockdowns may be effective in stopping the spread of the virus,⁴³ but due to their social and medial impacts, as evidenced in our study, other measures should be investigated. Policies should include education to inform the design of effective health policies for prevention and preparedness of future pandemics,^{44 45} and should be designed to incorporate broad application of video technology, initiation of COVID-19 testing and reorganisation of care spaces and staffing models.⁴⁶ Future suggestions to increase family-centred care should focus on family presence policies, a critical component of child and family-centred care that have been impacted by the varying aspects of the COVID-19 pandemic. These could include: facilitating two-caregiver presence to support shared decision-making incorporating virtual technology when physical presence is limited, consider the involvement of siblings, for example, allotted visitation times for siblings and leveraging technology, ensure access to exemptions to the family presence policy is available and accessible and acknowledge the challenges clinicians experience as a result of the disruption to child and family-centred care. Future recommendations to support clinicians could include peer-to-peer support groups and mental health supports.^{47 48}

Limitations

This study was performed in a single tertiary care paediatric academic centre, limiting its generalisability. We recognise that the approach taken by hospitals to the COVID-19 pandemic may vary.⁴⁷ The case finding methodology used was not real time and cannot provide a denominator or frequency for events. However, a thorough review of M+M records uncovered only one additional case, suggesting that the frequency of survey distribution and its prospective nature might mitigate this limitation. The study is clinician centric, but involved only doctors and advanced practice nurses. A broader

representation of healthcare providers including bedside nurses and allied health professionals would result in a richer understanding of the disruption in care related to the COVID-19 pandemic. The involvement of patients and family caregivers is required to enhance our understanding,³⁸ as the challenges faced by patients due to delays might be overlooked. More subtle manifestations of inequity may have been overlooked as the study did not examine the various contributing factors to the individual experience of the pandemic. Lastly, the results reflect the experience of frontline clinicians who chose to respond and are therefore subject to their bias. To truly understand the parent and child perspective, we plan to further engage with families and describe their experiences as a future step in this work.

CONCLUSION

The broad consequences of health system changes as a result of the COVID-19 pandemic have impacted patients, families, healthcare providers and the healthcare system as a whole. Understanding the breadth of this impact from a clinician's perspective is essential as we strive to deliver safe, high-quality, family-centred paediatric care in this new era. Considerations for both health system and policy are required to ensure child's health and long-term developmental outcomes are considered when making decisions. As we plan for future pandemics or abrupt changes in healthcare delivery, we need to carefully consider how best to provide elective and ambulatory care, including surgery, in this era of infection control. Particular attention should be paid to ensuring timely access to safe care for children with special needs and families from disadvantaged settings lacking in resources.

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