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Title: Pediatric primary care in Ontario and Manitoba during the COVID-19 pandemic: a population-based study

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Reviewer 1: Dr. Wilson Pace

Institution: University of Colorado, DARTNet Institute

General comments (author response in bold)

There have been a number of reports on changes in health care utilization caused by the COVID-19 pandemic. The strengths of this report include a focus on the pediatric population (which overall has higher well-visit utilization than adult populations), the population-based data availability and the ability to link to social determinants of health and immigration/refugee status. The data analysis plan is sound and reasonably described. The data appear to have high validity concerning visits, and face to face vs telehealth delivery of care. Given the limited requirements within Canada for diagnostic coding per visit the level of detail at the well visit vs other (called “sick” in the current manuscript) is likely to be an appropriate level of detail. The overall findings mostly track with other reports with a significant drop in total visits and a major shift to telehealth (though distinctly different in scale between the two provinces.) The uptick in any group of individuals for any cause (in this case in newborn visits) is surprising and not seen in other reports this reviewer is aware of. The return to close to baseline rates of visits clearly occurred long before the pandemic was over but appears to track with a trough in the infection rate in Canada.

Thank you for the very positive comments on our manuscript.

This manuscript is very dense and while there are numerous figures and tables the data are not presented in a way that makes the take home messages easy to follow. For most readers the weekly and monthly detail may be nice to have but the high level findings are easy to lose in the details as presented. The overall visit rows of data in Tables 2 through 5, if thoughtfully combined into a single figure, would be very illustrative. But, currently, these data are buried across 4 very large tables.

We have made significant changes to the presentation of the data such that we provided a summary figure of the key findings, as suggested by the Editor and Statistician.

In reviewing the overall data, as they are broken down by age and demographics, it is actually surprising how many of the comparisons appear to not be significantly different as judged by the 95% CI's. Given the size of the data it is typical to find even small differences to be highly significantly different so actually the similarities should be commented upon within the Discussion more strongly.

We have tempered our ‘Interpretation’ about the extent of the differences observed. For example, in the first paragraph of the interpretation, we wrote, “Importantly, we report small disparities in the extent of shifts in primary care in Ontario but not in Manitoba, with a disproportionate reduction in essential well-child care for children and adolescents from immigrant and refugee families, and low socioeconomic status and urban neighbourhoods. Further, in the ‘Conclusions’, we have written, “Ontarian but not Manitoban children from low socioeconomic status and urban neighbourhoods had slightly less care”

Clearly Well Child visits held up in Manitoba better than in Ontario, whether they included immunizations or not, while non-well visits (hard to know if they were for actual illness or not) dropped to the same degree. The drop in true “illness related” visits has been seen across much of the world, presumably due to decreased transmission of other infectious agents. Thus, the drop in these visits may be a true reflection of the burden of illness after the newborn age range, not concerns about visiting the medical practice. This is not commented upon in the Discussion. One report from the US indicated that asthma exacerbations dropped by 30%, for instance, using self-reported data before and during the pandemic. Therefore, not affected by office or emergency room visits. This change tracks very closely with the drops seen in this report. The increase in “sick” visits in the newborn age group is very unusual and worthy of some comment. Newborns often have issues that parents want to understand better that are non-infectious and thus likely to occur at the same rate with or without COVID-19, but why the rate would increase is curious.

We have added to the first paragraph of the ‘Interpretation’: While delays and reductions in primary care were expected given the large disruptions to service delivery and decreased transmission of other infectious agents, the drop in primary care delivery for children persisted through the first nine months of the pandemic including during periods when little virus was circulating, personal protective equipment and infection control measures were more available, and only then started to recover towards baseline levels.”

We did not examine why newborns had an increase in ‘sick’ visits in this study, though we agree that this is an interesting/unusual finding. It is possible that there were changes birth hospitalizations (e.g. shorter length of stay, reduction in breast feeding support programs, changes in access to providers in the hospital setting) and these visits occurred to support parents in the period immediately following discharge, especially for feeding and growth concerns that would have otherwise been addressed in a hospital setting. This is however speculative and remains outside of the scope of the current study and is an important area for further investigation.

Finally, the Discussion seems to highlight differences and perhaps disparities in care between disadvantage populations or immigrants/refugees. Many of these differences appear to be more “trends” than truly significant differences. Alternatively, all of these “trends” could be interpreted as indicating “no difference” in access to or use of primary care. The authors need to explain why “trends” should be so central to the Discussion instead of highlighting the resilience of the system to provide care to most Canadians in fairly equal levels during a tumultuous time. In our work looking at similar data across multiple countries we have found it helpful to plot the monthly or weekly visit data against the background infection rates for each area. This may be informative as well given the chaotic nature of the weekly plots.

To clarify where “trends” vs. “significant differences” occurred, we have added a new figure that summarizes the key findings. We have tempered the discussion about the extent of the observed differences. We report where differences and similarities exist including, “The COVID-19 pandemic has magnified structural factors underpinning global health inequities²⁶⁻²⁸ and our findings show that, at least in Ontario but less so in Manitoba, primary care for children may have also been affected.” And “Equitable primary care utilization observed in Manitoba may be related to more centralized pediatric primary care delivery through hospital-based clinics that serve large proportions of urban, refugee, and low-income

children.³³ “ and “Ontarian but not Manitoban children from low socioeconomic status and urban neighbourhoods had slightly less care.”

Overall this is an interesting report that needs to better highlight the main take home messages and be clear about whether differences between groups with overlapping CI's represent real differences or represent expected variations in health care utilization overall.

We have added two figures that highlight the key differences/take home messages and clarify overlapping CI's.

Reviewer 2: Dr. Maria Mathews

Institution: Schulich School of Medicine and Dentistry

General comments (author response in bold)

Abstract could better distinguish between well child and sick child visits in results

The abstract is limited to 250 words, as per CMAJ Open requirements. As such, we aimed to focus our results on the key findings of what occurred in terms of primary care visits overall and virtually with specific RR's and % and descriptively explain results by equity strata. Because our main objective was not to distinguish well-child from sick visits (this was a secondary objective) and due to space constraints, we elected not to put these details in the abstract.

P 1, lines 29-32: “Reduction in pediatric primary care (both virtual and in-person) as a consequence of non-pharmacological interventions and imposed restrictions to reduce SARS-CoV-2 infections may lead to lasting health and social consequences for children and their families”. I'm not sure what non-pharmacological interventions means or refers to in this context.

Non-pharmacological interventions (sometimes referred to as non-pharmaceutical interventions) are actions (besides vaccines or taking medications) that people and communities can do to reduce the spread of illness. In the context of COVID-19, these are community mitigation strategies and NPI's have become a common term used in health care, policy, and media for describe infection control measures. For clarity, we have added references from the CDC and WHO for the reader that describes these.

Age of Children not defined in population section. Cohort adds newborns. What about children who became adults - were they excluded on an rolling basis? Tables suggest children up to age 17 are included in analysis but this is not clear in the methods.

We have clarified that we included children who were <18 years between January 1, 2017 and November 28, 2020 in the population section. To obtain the population denominator, they needed to be <18 on January 1 of each study year (Table 1). For the numerator, we used their age on the date of the visit. We describe (Analyses section), “ Visit rates were expressed as total visits per 1000 eligible population, computed overall and by subgroups of clinically relevant age groups with age defined on the day of the visit^{19,20} “ and “For non-newborns, we aggregated daily visit counts to strata of age group, sex and week, and used the corresponding population on January 1st of each year as the denominator for rates as it did not change significantly over the year”

Visits per 1000 population (clarify whether total population or children)

This refers to each specified population. We have modified the first line of the second paragraph to say “Visit rates were expressed as total visits per 1000 eligible population, computed overall and by subgroups of clinically relevant age groups^{19,20} (<28 days (neonates), 29 to 365 days [infants], 1 to 5 years [toddlers and pre-school], 6 to 12 years [school age], and 13 to 17 years [adolescence]), rurality, immigrant status and deprivation quintile”

Analyses clustered count data to model pre-COVID trends. Some description of these pre-COVID trends would be helpful

The pre-COVID trends are described in the first paragraph of the results section called “Pre-COVID Primary Care” where we describe the pre-COVID visit rates in each of Ontario and Manitoba and by well-child and sick visits.

Some description of the relative number/proportion who would be seen by alternate health care providers (e.g. public health nurses, nurse practitioners) or who are excluded from billing data (e.g. CHC) would be helpful.

We do not have measures of visits by public health nurses. We do describe in the limitations the proportion of visits not typically captured (<1%), “Salaried physician and some non-physician care (< 1% of population)³⁷ including from community health centres, nurse practitioners and social workers, was not included due to data availability”

Analyses do not include child visits to ERs (presumably, most of these would be sick child visits). Some indication of how ER visits fits into the picture would be helpful (or should be included as a limitation).

The objective of this study was to measure visits to primary care, not to acute care (which is typically open 24/7 and can provide a higher intensity of care and for more acute problems) and this, while important, is not in scope for this paper focused on primary care. This has been studied elsewhere and we include this in the Interpretation section, “In parallel to these observed changes in primary care, there was a substantial shift in caregiver and family health-seeking behaviour for acute care and after-hours ambulatory care in Canada and elsewhere with large, rapid declines in visits following the pandemic onset”, with several reference to these studies included.

Figure 1 is difficult to read. Different colours do not readily show up on screen
This figure has been modified for clarity.

In interpretation, I would prefer more explanation of trends seen rather than comparisons to Chicago and South Africa where COVID rates, pandemic response, and primary care systems are different.

International comparisons (and comparisons to other health systems) are essential in health services research to better understand how different interventions/events affect populations and what we may do to improve our health system. Though health systems in South Africa and Chicago may have differences from the Canadian setting, there are many similarities in terms of COVID-19 affecting large populations, inciting fear, lockdowns, changes in models of care, etc. As such, we feel these comparisons are essential for context and health system learnings.

I would like to see:

- comment on why sick visits were less (e.g. lower incidence of infectious disease, lack of childcare and other children programs that require sick notes).

This study aimed to measure changes to utilization of primary care and did not measure why these changes were observed.

Further study is warranted to understand why these documented changes in utilization occurred and we hesitate to be too speculative in interpreting our findings (e.g. the need for sick notes for work or childcare is not discernible from billings data). We aimed to keep our explanations ‘high level’ including, “It is unclear the role providers had in contributing to these shifts in primary care delivery including from a lack of personal protective equipment, workforce redeployment, capacity for virtual care delivery, and practice jurisdiction.” And have added, “While delays and reductions in primary care were expected given the large disruptions to service delivery and decreased transmission of other infectious agents, the drop in primary care delivery for children persisted through the first nine months of the pandemic including during periods when little virus was circulating, personal protective equipment and infection control measures were more available, and only then started to recover towards baseline levels.” We further describe that the changes may be related to health-seeking behaviours.

- some indications of potential consequences of shifts in utilization on health of children that we are likely to see in post-pandemic period.–

In our conclusion, we state, “The pandemic, and measures instituted to assuage its impact, may have threatened essential elements of primary care, including the mechanisms in place to mitigate spread of vaccine preventable diseases, ensure early identification of developmental concerns, and reduce health inequities. The longer-term impact on child development, health, and vaccine coverage remains to be determined.”

- comment on unattached versus attached patients, use of ER. As an unattached patients with an unattached child, options for virtual care (for either well or sick visits) were limited.

Understanding models of care delivery, including rostered/attached patients is important for improving our primary health care system. The impact of the pandemic and switch to virtual care is important to understand, especially for unattached patients. The notion of attached/unattached patients is out of scope for this paper and is an important question for future study.

- greater description of the context of pandemic restrictions. For example, interpretation states: Ontarian but not Manitoban children from low socioeconomic status and urban neighbourhoods had less care. However, Toronto was under greater COVID related restrictions, and might explain this observation

In the last paragraph of the ‘Introduction’, we have added the months of the waves in each respective province. We have added are reference to the COVID intervention timeline in Canada for context. <https://www.cihi.ca/en/covid-19-intervention-timeline-in-canada>

- differences in immigrant and refugee children’s utilization between the two provinces. I am really struck by the larger proportion of immigrant and refugee children

in Manitoba over Ontario. This runs counter to general impressions that Ontario has a larger immigrant population.

The Ontario population of immigrants is much larger than in Manitoba. As shown in Table 1, Ontario has more than 10x the number of refugees than Manitoba and 5x the number of non-refugee immigrants. However, as a proportion of the total population, indeed, Manitoba has more immigrants than Ontario.

Overall, this is a really interesting article

Thank you.