

# Potential use of telemedicine in paediatrics: a single-centre retrospective review

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## ABSTRACT

Recent advancements and adoption of telemedicine have affected all aspects of healthcare including paediatrics. While telemedicine has the potential to increase access to paediatric care, the limitations of this service in its current iteration bring into question its usefulness for direct replacement of in-person care, particularly in an acute or urgent care setting. This retrospective review demonstrates that only a small percentage of in-person visits to our practice would have resulted in definitive diagnosis and treatment if facilitated via telemedicine. There is a need for better and more widespread data collection techniques and tools suitable for paediatric remote care implementation before telemedicine becomes a useful diagnostic and treatment tool in an acute or urgent care setting.

## INTRODUCTION

During the COVID-19 pandemic, telemedicine saw over a 600% increase in usage as the healthcare industry transitioned away from in-person care.<sup>1-3</sup> Outside of a pandemic setting, telemedicine, particularly in the paediatric space, also has the potential to provide broader reach and access in areas without these resources.<sup>4</sup>

Additionally, telemedicine has shown equal efficacy compared with in-person visits in certain cases as demonstrated by a recent systematic review.<sup>5</sup> It is important to note, however, that this systematic review examined conditions that do not rely heavily on objective data collection such as mental health evaluations or chronic condition management where an in-person visit would have been a part of the management plan. For the acute conditions included in the analysis, data collection tools such as cameras or cellular device otoscope attachment were part of the study design.

Telemedicine also comes with several drawbacks, not least of which is that healthcare systems are largely based on in-person interactions.<sup>2</sup> Additionally, quality telemedicine encounters are based on access to costly and non-widely distributed

technologies, which tends to favour those with privilege.<sup>6</sup>

Our hypothesis is that telemedicine is likely ineffective in terms of definitive diagnosis and treatment in the acute and urgent care setting and that in the absence of data collection tools, most of the visits presenting to our clinic could not be definitively managed via telemedicine alone.

In order to evaluate the effectiveness of telemedicine in the acute and urgent care setting, we retrospectively reviewed 2019 visits to our paediatric primary and urgent care clinic in Portland, Oregon, pre the SARS-COV-2 pandemic from 2019 to early 2020. Our clinic provides routine and urgent (non-emergent) care to paediatric patients aged 0–21 years. As the majority of our practice is acute care, telemedicine at our practice is almost entirely used to address new acute concerns or injuries.

## METHODS

A retrospective chart review was conducted for all in-person visits at our paediatric primary and urgent care office located in Portland, Oregon. The current study includes 4 months leading up to the start of the COVID-19 pandemic (November 2019 to February 2020). Each patient visit (n=2019) was first categorised into groups deemed automatically incompatible with telemedicine such as need for a procedure or additional workup. Due to the hours of operation and lack of a pre-existing relationship with our patients, sending them to an outside centre for blood work or imaging is not practical.

The remainder of the visits were reviewed by an experienced paediatric clinician and divided, based on the available documentation in the note, into whether definitive treatment via telemedicine was likely of value, potentially of value, or not of value.



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**Table 1** Visit counts by category grouped by likelihood that telemedicine would lead to definitive diagnosis and treatment

	Telemedicine likely of value	Telemedicine potentially of value	Telemedicine not of value	Total
Cold/respiratory symptoms	3	172	236	411
Head/eye/ear/nose/throat/mouth concern	43	156	66	265
Fever	2	91	40	133
Gastrointestinal/genitourinary concern	0	56	53	109
Rash	38	54	30	122
Injury	3	25	76	104
Behaviour change	0	18	9	27
Procedure	0	3	232	235
Other	2	3	22	27
Additional workup needed	0	0	586	586
Total	91	578	1350	2019

Information on data validation can be found in online supplemental file 1.

## RESULTS

Our study included 1567 distinct patients representing 2019 visits. The majority of patients (n=63.15%) were under 5 years of age.

Telemedicine would not have led to definitive diagnosis and treatment for 1350 visits (n=66.86%). Telemedicine would have been potentially useful for definitive diagnosis and treatment for 578 visits (n=28.62%) and would likely have been useful for definitive diagnosis and treatment in 91 visits (n=4.51%). The diagnoses most likely to have been definitively treated with telemedicine are rashes and head/eye/ear/nose/throat/mouth concerns (table 1).

## DISCUSSION

Our findings support our hypothesis that the majority of paediatric patients who visited our practice during the study period could not have been treated definitively via telemedicine. Rather, telemedicine is of most utility as an augmented triage tool.

Given the recent surge in telemedicine services and utilization around the COVID-19 pandemic, it is clear that a significant portion of the proliferation energy in telemedicine solutions could be better used perfecting remote data gathering tools geared specifically towards paediatric patients. We would expect that a substantially higher portion of our visits could have been definitively diagnosed and treated with telemedicine if some basic exam and laboratory data could be obtained at home.

There are several limitations of our study. Selection bias by retrospectively analysing in-person visits is one such limitation. In addition, despite analysis by expert paediatric clinicians, there is some subjectivity to judging whether a patient might or might

not have been definitively diagnosed and treated via telemedicine. Another limitation is that our clinic almost entirely caters to acute and urgent illnesses and concerns. It is likely that due to the nature of the presenting complaints, telemedicine alone would not be sufficient for diagnosis and treatment without additional patient data. Finally, due to its retrospective nature, our study cannot comment on whether the patients who were deemed to need in-person treatment would have been fine without a visit and vice versa.

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**Supplement 1: Data Validation**

To validate the accuracy of category assignment, a random sample of 200 patient visits sorted into the automatic telemedicine exclusion categories was analyzed by an experienced pediatric clinician in a blinded fashion. Further, to validate the accuracy of categorization of the remaining visits above into the telemedicine likely of value, telemedicine potentially of value, and telemedicine not of value, a separate random sample of 200 patient visits was analyzed in a blinded fashion by a second experienced pediatric clinician. Interrater reliability was found to be 97.5% for the automatic telemedicine exclusion criteria. This includes five visits that were mistakenly misclassified into the automatic exclusion groups. However, all five would have been placed into a group where an office visit would have been necessary for definitive treatment. Interrater reliability was 41.5% for the remaining patient visits when looking at exact matches across telemedicine likely of value, telemedicine potentially of value, and telemedicine not of value. However, there was 92% agreement when telemedicine not of value and telemedicine potentially of value were combined.