Visits for Possible COVID-19 in a Pediatric Primary Care Practice Early in the Pandemic

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ABSTRACT

BACKGROUND: Children with COVID-19 usually present with mild symptoms. We characterize visits with respect to symptoms and testing in the outpatient setting.

METHODS: A retrospective chart review of sick visits in a pediatric academic primary care clinic April-August 2020. We included possible COVID-19 cases, or "persons under investigation" (PUIs), recording symptoms, positive contacts, and COVID-19 testing. Descriptive statistics and Chi-square or Fisher's exact tests for comparisons were used.

RESULTS: 32% (476/1,474) of sick visits were PUIs; 20% were telehealth. Symptoms most commonly reported were fever, congestion/rhinorrhea and cough. 76% of PUIs were tested for COVID-19. Only presence of COVID-19 contacts and loss of taste/smell were significantly associated with positive tests ($p<0.001$).

CONCLUSION: Nearly a third of sick visits in an academic pediatric practice were seen for possible COVID-19 symptoms and most were tested. The majority with *and* without COVID-19 had fever, congestion and/or cough. Our findings suggest low thresholds for testing in children.

KEYWORDS: COVID-19, pediatric, outpatient

ABBREVIATIONS

COVID-19 = Coronavirus-19
PUI= person under investigation
IQR = inter-quartile range
CDC = Centers for Disease Control
MIS-C = Multi-system inflammatory syndrome in children

INTRODUCTION

The coronavirus disease 2019 (COVID-19) pandemic has presented unique challenges to pediatric providers. COVID-19 affects children differently than adults, with a relatively mild course of illness with initial infection[1,2], contributing to uncertainty in how outpatient pediatric providers should manage patients with viral symptoms. Moreover, the CDC-recognized list of COVID-19 symptoms strongly mimics a variety of other high prevalence viral illnesses in the pediatric population.

Though social distancing and lockdowns have thwarted much of the spread of common viral agents[3,4], outpatient pediatric providers have had to adapt to frequent changes in clinical guidance while continuing to care for sick children and provide public health advice. Such clinical guidance has rarely been pediatric-focused. Additionally, outpatient healthcare providers of all specialties have had to quickly adapt to changes in practice to accommodate stay-at-home orders and recommendations to minimize exposure as much as possible.[5] While pediatric providers have a great deal of experience with telephone triage[6], telehealth sick visits have not been routinely performed.[7] This, along with the many unknowns regarding how concerned to be regarding COVID-19 in various pediatric patients – from newborns to those with complex healthcare needs – presented unique challenges to outpatient pediatric practices across the country. While the current landscape of the pandemic has changed dramatically due to the rollout of vaccines, children under 12 years old remain at risk at this time. Additionally, the possibility of ongoing seasonal COVID-19 outbreaks emphasizes importance on discerning this infection from other common viruses in children.

Within one practice, we examined visits for possible COVID-19 over a five-month period early in the pandemic to characterize symptom and testing frequency and to evaluate factors associated with testing and positive versus negative test results in the pediatric outpatient setting.

METHODS

Study setting

We conducted a retrospective chart review of sick visits at a large urban academic pediatric primary care clinic located at Hasbro Children's Hospital in Rhode Island from April 1 through Aug. 31, 2020. The clinic serves a population of about 10,000 patients from multi-ethnic backgrounds and families with low incomes. The clinic's Urgent Care sees all same-day sick visits and is staffed by general pediatric faculty and residents.

We collected data during a period early in the pandemic when COVID-19 testing was available within the clinic and at drive-up sites. Additionally, on April 1, 2020, the Rhode Island Department of Health announced expansion of testing recommendations to include any symptomatic individual,

rather than high-risk populations only, and encouraged anyone with symptoms to call their healthcare provider and obtain testing. During the pandemic, only scheduled visits (both in-person or telehealth) were available after discussion with a phone triage registered nurse; however, an in-person visit was never declined if that was desired by the parent/guardian. Walk-in appointments were not offered. The study was approved by the hospital Institutional Review Board.

Data Collection and Analysis

We included charts for all in-person and telehealth sick visits for patients up to 18 years. Well-child or follow-up visits were excluded, even if sick symptoms were reported. We reviewed charts based on the CDC's 12-symptom list[8] to identify possible COVID-19 cases, herein called "person under investigation" (PUIs). Documentation of symptoms, positive contacts, and COVID-19 testing status and result were recorded. If a test had been obtained at an outside site (emergency department or state site) during the same episode of illness and reported in the visit encounter, this was included.

All data was recorded in REDCap[9] and R version 4.0.3 was used for data analysis. We report descriptive statistics and Chi-square, Fisher's exact, and Wilcoxon rank sum tests comparing variables for those tested versus those not tested and positive versus negative results. We also compared variables for patients seen in-person versus telehealth using these same analyses.

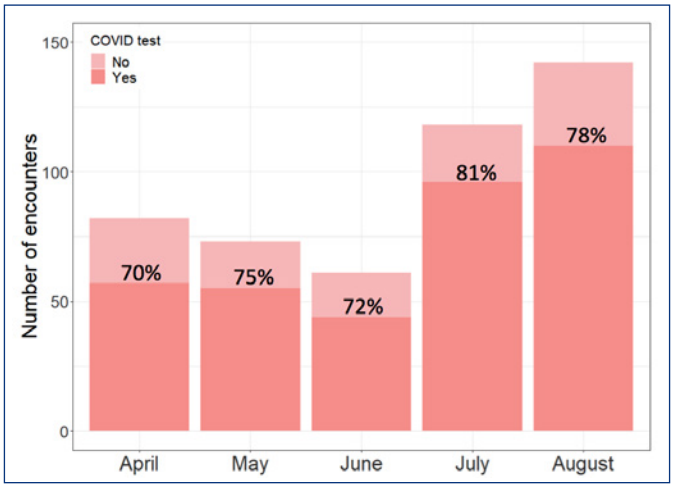
RESULTS

We reviewed 1,474 sick visits charts of which 32% (n=476) of these were PUIs. Eighty-percent of PUI visits (n=383) were conducted in-person, while 20% (n=93) were telehealth. Among PUIs, the most common symptoms were: fever (n=205, 43%), congestion/rhinorrhea (n=201, 42%), and cough (n=177, 37%). See **Table 1** for patient characteristics.

Testing Decisions

The majority (n=362, 76%) of PUIs were tested for COVID-19, ranging from 70% in April to 81% in July. See **Figure 1**. The most prevalent symptoms for those tested were fever (n=170, 47%) and congestion/rhinorrhea (n=170, 47%), followed by cough (n=147, 41%). Those not tested (n=114, 24%) presented with the same top symptoms: fever (n=35, 31%), congestion/rhinorrhea (n=31, 27%), and cough (n=30, 26%). Greater median number of symptoms (p<0.001) and reported COVID-19 close contact (p<0.001) were significantly associated with COVID-19 testing. See **Table 1**.

Figure 1. Monthly PUI visits with percent COVID-19 tested shown on stacked bar



Test Outcomes

Overall COVID-19 test positivity was 8%, ranging from 5% in June to 15% in May. See **Figure 2**. The most prevalent symptoms in COVID-19 positive patients (n=29) were congestion/rhinorrhea (n=16, 55%), followed by cough (n=14, 48%) and fever (n=14, 48%); these symptoms were similarly found in COVID-19 negative patients. Only loss of taste or smell was present significantly more in patients who tested positive for COVID-19 (p<0.001). See **Figure 3**. Number of symptoms did not differ significantly for COVID-19 positive and negative patients. The only patient variable significantly associated with a positive test was reported COVID-19 close contact (p<0.001). See **Table 1**.

Table 1. Demographic and clinical characteristics for all PUIs, stratified by COVID-19 testing status and COVID-19 test result, n (%)

Patient characteristic	All PUIs n=476	Tested n=362, 76%	Not Tested n=114, 24%	p-value[1]	Positive n=29, 8%	Negative n=333, 92%	p-value[1]
Age in years, median (IQR)	5 (1–11)	5 (1–11)	5 (2–11)	0.954	9 (1–17)	5 (1–11)	0.112
Female gender	241 (48)	180 (50)	61 (54)	0.550	15 (52)	165 (50)	0.975
Medicaid	436 (92)	328 (91)	108 (95)	0.117	25 (86)	303 (91)	0.322
COVID-19 contacts	56 (12)	**54 (15)**	**2 (2)**	**<0.001**	**14 (48)**	**40 (12)**	**<0.001**
Presented ≥ 3 symptoms	162 (34)	**149 (41)**	**13 (11)**	**<0.001**	15 (52)	134 (40)	0.313
Number of symptoms, median (IQR)	2 (1–3)	**2 (1–3)**	**1 (1–2)**	**<0.001**	3 (2–4)	2 (1–3)	0.181

[1]Fisher's exact test; chi-square test of independence; wilcoxon rank sum test comparing tested to not tested as well as positive to negative cohorts
PUI = person under investigation, IQR = inter-quartile range

Figure 2. Monthly COVID-19 tests with percent positive shown on stacked bar

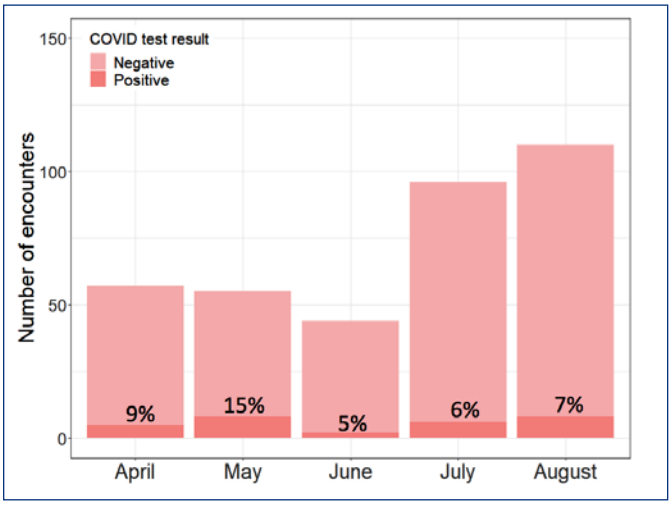


Figure 3. Symptom prevalence stratified by COVID-19 test result

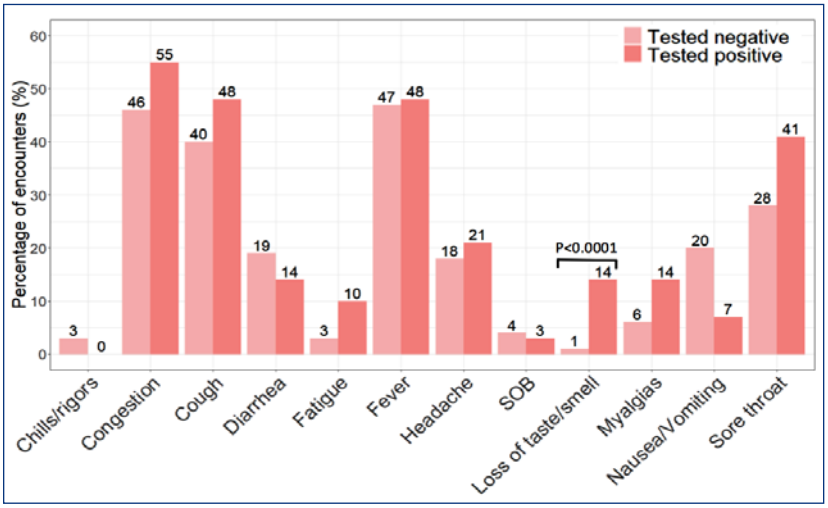


Table 2. Demographics and clinical characteristics for in-person PUIs compared to telehealth PUIs, n (%)

Patient characteristic	In-person PUIs N=383	Telehealth PUIs N=93	p-value12
Age in years, median (IQR)	**4 (1–10)**	**6 (3–12)**	**0.014**
Female gender	194 (51)	47 (51)	>0.99
Medicaid	356 (93)	80 (87)	0.055
COVID contact	**29 (8)**	**27 (29)**	**<0.001**
Presented ≥ 3 symptoms	138 (36)	24 (26)	0.081
Number of symptoms, median (IQR)	2 (1–3)	2 (1–3)	0.05
Tested for COVID-19	**303 (79)**	**59 (63)**	**0.001**
Positive for COVID-19	21/303 (8)	8/59 (14)	0.086

[1]Fisher's exact test; chi-square test of independence; wilcoxon rank sum test comparing tested to not tested as well as positive to negative cohorts
PUI = person under investigation, IQR = inter-quartile range

In-person vs. Telehealth Visits

Patients seen through telehealth visits were significantly older (p=0.014) and reported COVID-19 close contacts more frequently (p<0.001) than in-person visits, while number of symptoms did not differ. See **Table 2**. Fever, congestion, and cough were the top three symptoms reported for both in-person and telehealth visits, though fever was significantly less prevalent in telehealth than in-person visits (n=25, 27% vs. n=180, 47%, p<0.001). Thus, fever was the top symptom for in-person and third most common symptom for telehealth. Additionally, sore throat (n=113, 30% vs. n=14, 15%) and nausea/vomiting (n=76, 20% vs. n=10, 11%) were more prevalent for in-person than telehealth visits (p<0.001 for both). Tests were ordered on 63% (n=59) of telehealth visits, compared to 79% (n=303) for in-person (p=0.001), and the positivity rate was 14% (n=8) compared to 7% (n=21), respectively (p=0.086).

DISCUSSION

Nearly one third of all sick visits seen in an academic pediatric practice during the early months of the COVID-19 pandemic were PUIs. Of those, over three quarters were tested, with an overall COVID-19 positivity rate of 8% (ranging from 5–15%).

Although number of symptoms played a role in *who* was tested, no differences were found in number or type of symptoms in COVID-19 positive versus negative patients, other than loss of taste/smell. Loss of taste or smell was a relatively specific, though not sensitive, finding for COVID-19, supporting evidence for heightened suspicion if this symptom is discovered amidst other more common "viral" symptoms. Moreover, fever, congestion/rhinorrhea, and cough were the most common symptoms in those tested and not tested. The lack of difference in prevalence of these common symptoms shows how indistinguishable COVID-19 is in children from other viral respiratory illnesses and suggests providers should have a low threshold for testing children with viral symptoms, regardless of type or number of symptoms.

With loosening of social distancing and mask mandate restrictions, pediatricians will be assessing more children with fever, cough, and congestion. In fact, many viral illnesses have recently re-emerged and rates are rising quickly in the pediatric population.[10-12] Pediatric emergency departments and primary care offices are returning to higher volumes. At this time, lower community prevalence,

natural immunity, and the vaccination of adults and children 12 years and up for whom the vaccine is now approved help provide some protection for younger children. However, full protection cannot be assumed.

Early studies had suggested children are less likely to spread COVID-19. However, as more adults and teens are vaccinated and newer research unfolds, it has become more evident that children, particularly those 10 years and up, do play a role in transmission, particularly within households.[13] Indeed, children do seem to carry the same viral load in their upper respiratory tract as adults, even when mildly symptomatic or asymptomatic.[14,15] Fortunately, children do not exhibit the same severe respiratory effects of this infection; however, important questions remain, and new questions arise daily. Multi-system inflammatory syndrome in children or "MIS-C," while very rare, continues to be a concern. Additionally, children's role in community spread is now more important than ever, as they remain the last group to be vaccine-eligible and make up a growing proportion of new infections. Transmission from children poses risk to unvaccinated adults and elderly or immune-compromised individuals, who likely do not gain the same protection from immunization. Prolonging community spread also poses risk of variant emergence[16], which has become more evident in other parts of the world not experiencing a decline in COVID-19 rates like the United States.

Our findings pose a number of questions for pediatric practices and public health policies going forward. The inability to discern COVID-19 from other common viral illnesses highlights the importance of testing. While point-of-care rapid antigen testing is not as sensitive as PCR, the ease of use, quick results and fairly good sensitivity in symptomatic individuals (if used early on in symptoms when viral load is highest) may induce widespread adoption of its use in pediatric offices handling large volume of sick visits.[17] However, currently confirmatory testing with a PCR test for negative antigen tests is still recommended by the CDC; thus, while the antigen test may yield quick results, this extra step may not exactly lessen the impact on families. Additionally, while false negatives are often the concern most discussed regarding rapid antigen tests, when community prevalence is low enough, false positive rates near false negatives – both are problematic.

With the uptick in non-COVID-19 viral illnesses in the pediatric population expected during the fall and winter months, coinciding with relaxation of social distancing measures, it is paramount that improved guidelines for testing and quarantine become available to pediatric providers. In reality, some pediatric practices have still not re-instated sick visit availability while others have attempted to cohort sick and well to different locations or sessions. These measures are not only costly and revenue reducing[18], but have also had an impact on the availability and timing of well-child visits.[19] Additionally many practices rely on private or state-run testing sites to augment telehealth visits and keep suspected COVID-19 cases out of the office. This was evident in our cohort, with the higher positivity for telehealth encounters. The ability to continue this practice will depend on the availability of an adequate testing infrastructure.

Our findings bring up questions about children in congregate settings, namely schools, particularly for this coming fall/winter. Even with vaccination, which certainly limits spread and disease severity, outbreaks can be expected. We now know that children are vectors of infection, even though spread within the school setting (particularly for elementary age children) has been low.[20] Less controlled settings, like sports activities and social events are more likely associated with child-child transmission.[21] Will schools continue with strict illness policies as they have now? These have major impact on parent/guardians' work productivity and loss of in-person learning time for children.[22,23] These policies have been feasible, again, because of significant infrastructure in place (e.g. prompt access to testing through K-12 sites, quick PCR turnaround, remote learning options for children awaiting test results or needing to quarantine for close contacts). With all children presumably back to in-person school going forward, the return of the usual spread of viral respiratory illnesses in schools is expected – school officials may face even more challenging decisions regarding testing and illness policies as long as the lingering threat of COVID-19 remains.

Finally, this study highlights a sentiment felt by pediatricians throughout the pandemic – a drastic change in our guiding mantra: general reassurance to parents about run-of-the-mill viruses. The difficulty in distinguishing COVID-19 from the myriad of common viral infections has altered our way of practicing, and rerouted the automatic mental processing that we do all day.[24] We fear this may impact parents' understanding of supportive home care in the long run.[25] In addition, this has led to feelings of exhaustion and burnout among our work force.[26]

LIMITATIONS

As this study was conducted through retrospective data collection, we were limited to data available within the electronic medical record. Variation in both documentation and patient management likely existed between providers as well as over time throughout the pandemic, as more was understood about patient symptoms and community spread. Our research was confined to a single academic clinic site and practice behaviors may differ from other settings. Particularly, our clinic had early access to COVID-19 testing, which was not available at many community practices. In the time frame of our study, patients in Rhode Island were required to have a provider order to obtain a COVID-19 test; thus, most children in our practice who were tested for COVID-19 were likely captured by our study. However, though testing was

recommended for all ages during the study period in Rhode Island, drive-up testing at the state-run sites was lacking early on. The variety of location options and accessibility for pediatric patients improved significantly throughout the pandemic, such that currently both providers and parents/guardians are able to request a drive or walk-up testing appointment easily and promptly.

CONCLUSION

This study provides a look at the initial months of the pandemic through the lens of outpatient pediatric providers with early access to testing. Our findings suggest readily testing children with mild or few symptoms. In the face of the marked changes that the pandemic brought to outpatient pediatrics as we know it, providers were able to pivot and incorporate COVID-19 testing and telehealth to provide sick visit care early in the pandemic. Looking forward, increased vaccination has allowed lessened social distancing, and, as a result, the make-up of circulating respiratory illnesses is changing. Due to the difficulty discerning COVID-19 from the common cold in children, testing remains paramount.

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