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The rapid increase in telemedicine visits during COVID-19

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Abstract

Prior to the COVID-19 pandemic, facilitated telemedicine encounters were available at outreach locations; however, our tertiary children's hospital had not invested widely in direct to patient telemedicine. Our daily pediatric subspecialty visits dropped from an average of 2066 visits a day prior to COVID-19 in our community to 1000 patients a day during the study period. Over the four-week period from April 15 to May 12, 2020, patient and family experience ratings of percentage of positive responses (9 or 10) on the provider rating 0-10 scale between telemedicine and in-person visits were compared for our pediatric subspecialty clinics using a Pearson's Chi Squared test, p-value <0.05 determined significance. Several process measures were compared using the same method. Total visits conducted via telemedicine and survey response rates were calculated with frequencies and percentages. Of the 14,428 subspecialty visits attended, 10,135 (70.2%) were telemedicine. Developmental and Behavioral Medicine saw the highest proportion of patients (99.5%) via telemedicine while Cystic Fibrosis, Dentistry, and Neurosurgery saw no telemedicine patients. Telemedicine visits yielded a 6.5% higher survey response rate than in-person visits. Overall rating of 9 or 10 for telemedicine visits was 87.9%, compared to 83.9% for in-person visits (p-value = 0.07). All process measures scored higher in telemedicine visits. This may reflect telemedicine visits' ability to improve the efficiency of care delivery: removing the need to travel, park, navigate the building, register for the visit, obtain vital signs and wait for the provider.

Keywords

Virtual visit, pediatrics, quality improvement, person-centered, COVID-19, patient experience

Introduction

The public health crisis of COVID-19 caused a large decline in outpatient clinic visits starting in early March with the highest sustained decrease in outpatient visits for pediatric care.¹ In response, practices across the country increased their use of telemedicine.¹ Indeed, April 2020 saw a 50% increase in telemedicine use nationally.² As a tertiary children's hospital with over 35 subspecialties, telemedicine had not been an option for most of our patients with less than 4% of all outpatient visits conducted via a telehealth platform. Most subspecialties were experiencing a steady growth in *facilitated* telemedicine visits. These were telehealth services at our regional outreach centers that were supported by a specially trained nurse tele-facilitator. The tele-facilitator ensured exceptional communication between the provider off-site and patient and family on-site. They initiated the encounter, managed the interface between doctor and patient (including the hands-on physical assessment) and addressed technical challenges. However, due to social distancing requirements and visitor restrictions in the hospital and clinic settings, a direct to patient telemedicine platform was necessary to fulfill the volume of patient visits scheduled during the height of the COVID-19 pandemic.

This study evaluates the patient experience ratings for direct to patient telemedicine pediatric specialty encounters in comparison to in-person visits during a four-week period during the COVID-19 pandemic.

Methods

Setting and Participants

This tertiary children's hospital in the center of the United States typically has over 200,000 specialty clinic visits per year. Each encounter receives a patient experience survey after their visit, so long as they do not fall within the exclusionary rules. Exclusion rules include patients who have received a survey for another encounter from the enterprise within the last 14 days, patients who have previously requested not to be surveyed or patients who are not living with a parent or permanent guardian.

Data Collection

A nationally validated survey was administered, one for telemedicine and the other for in-person visits.^{3,4} Telemedicine surveys were administered via two modes: email and interactive voice response (IVR), a computerized phone call. Some in-person specialty visits also utilized text messaging (SMS) as a survey delivery

modality in place of IVR. Each family received up to three attempts for survey completion. Families first received an email, or an IVR if an email address was not logged within the electronic medical record immediately upon discharging the encounter. If the family did not respond, a phone call was queued between 6:00pm-8:00pm two days after the encounter. If the family did not respond to the first two attempts, one final phone or text outreach was made again between 6:00pm-8:00pm the following day. Phone calls left a voicemail with callback instructions, so patients and families may complete the survey from the details left in the voicemail. The text message provided a link to an online survey, the same as the email link. The survey was available for 14 days and then expired.

Exposure

Direct to patient telemedicine visits were instituted via the Microsoft Teams platform (Version 1.3.00.9271). Patients and their caregivers had to be physically located in either Kansas or Missouri and the provider was most often conducting the telemedicine visit from their own home.

Outcome Measures

The primary outcome measure was percent of 9 or 10 scores (“positive responses”) on the overall rating measured by the question, “Using any number from 0 to 10, where 0 is the worst provider possible and 10 is the best provider possible, what number would you use to rate this provider?” Percent positive responses for specialty telemedicine visits were compared to in-person visits for four weeks (April 15 – May 12, 2020).

The secondary outcome measures were top box responses (“yes, definitely” on a four-point Likert scale) for six measures in two categories: person-centered and process. The person-centered category evaluated aspects of the relationship with the provider: getting enough information, active listening, trust in the provider and knowledge of the child’s medical history. The process questions for both surveys included timeliness of meeting with the provider and if the family knew what to do if they had questions. The telemedicine survey also had two questions about ease of connecting via the telemedicine platform and if they would recommend telemedicine to family and friends. Both surveys also included a final qualitative open-ended question to gather comments (Box 1).

Box 1. Survey questions and rating scales

TELEMEDICINE VISIT		IN-PERSON VISIT
Question Text	Response Scale	Question Text
Outcome		
Using any number from 0 to 10, where 0 is the worst provider possible and 10 is the best provider possible, what number would you use to rate this provider?	0; 1; 2; 3; 4; 5; 6; 7; 8; 9; 10 Worst Best Provider Possible Provider Possible	Using any number from 0 to 10, where 0 is the worst provider possible and 10 is the best provider possible, what number would you use to rate this provider?
Person-Centered		
Did this provider give you enough information about your child's health and treatment?	No; Yes, Somewhat; Yes, Mostly; Yes, Definitely	Did the care providers give you enough information about your child's health and treatment?
Did the care provider listen carefully to you?	No; Yes, Somewhat; Yes, Mostly; Yes, Definitely	Did the care providers listen carefully to you?
Did you trust the care providers with your child's care?	No; Yes, Somewhat; Yes, Mostly; Yes, Definitely	Did you trust the care providers with your child's care?
Did the care provider seem to know your child's medical history?	No; Yes, Somewhat; Yes, Mostly; Yes, Definitely	Did the care providers seem to know your child's medical history?
Process		
Were you able to talk to a care provider in a timely manner?	No; Yes, Somewhat; Yes, Mostly; Yes, Definitely	Was your child seen by a care provider in a timely manner?
Did you know what to do if you had more questions after your visit?	No; Yes, Somewhat; Yes, Mostly; Yes, Definitely	Did you know what to do if you had questions after your visit?
Was this method of connecting with a care provider easy to use?	No, Yes somewhat, Yes mostly, Yes definitely	
How likely would you be to recommend Telehealth to your family and friends?	0; 1; 2; 3; 4; 5; 6; 7; 8; 9; 10 Not at all Extremely likely likely	
Qualitative		
What else would you like to say about your experience?	NA	What else would you like to say about your experience?

Data Analysis

Data were entered into Microsoft Excel (Version 16.0.11929.20436). Pearson’s Chi Squared test for significance with p-value <0.05 was used to compare the percent positive responses for overall rating between telemedicine and in-person subspecialty visits from April 15 to May 12, 2020. The same method was used to compare the top box scores for process measures between telemedicine and in-person visits. Descriptive statistics were used to show percent of visits within a specialty clinic type to be delivered via telemedicine and returned surveys.

The Institutional Review Board at Children’s Mercy Kansas City deemed this non-human subject research.

Results

The impact of COVID-19 on attendance of clinic visits is displayed in Figure 1. The average daily attendance for clinic attendance from March 9-13, 2020 was 2066 patients per day. This number dropped precipitously the following week, and direct to patient telemedicine visits were instituted the week after (blue bars).(Figure 1) When the telemedicine patient experience surveys began on April 15, 2020, telemedicine visits were 62.2% of the daily visit volumes.

Over the four-week period from April 15, 2020 to May 12, 2020, a total of 15,562 visits were attended, 4370 in-person and 11,192 (71.9%) via telemedicine.(Table 1) Variability existed by specialty for the percentage of patients seen via telemedicine. Developmental and Behavioral Medicine saw 1582 patients via telemedicine (99.5% of all their visits), followed by Sleep with 304 telemedicine visits (99.3%) and Weight Management with 170 telemedicine visits (98.3%). Hematology/Oncology saw the fewest percentage of their patients via telemedicine (n=74, 11.5%), followed by Ophthalmology (n=66, 25.9%) and Orthopedics (n=369, 27.8%). Three clinics – Cystic Fibrosis, Dentistry and Neurosurgery – saw no telemedicine patients.

Response rates to the patient experience survey after an encounter varied by appointment type and specialty (Table 2). Telemedicine encounter response rates were slightly higher than in-person visits. Of the 2,129 telemedicine visits sampled during the study timeframe, 628 responded for a response rate of 29.2% (23.5% via email and 76.5% via IVR). Of the 3,173 families surveyed for in-person visits, 603 responded for a response rate of 26.1% (20.7% via email, 0.3% via SMS, and 79.0% via IVR). The response rates varied among subspecialties with larger variability for the in-person visit type (telemedicine 14.3% - 43.8%, in-person 0% - 38.4%).

Figure 1 Daily pediatric specialty encounter volumes by visit type

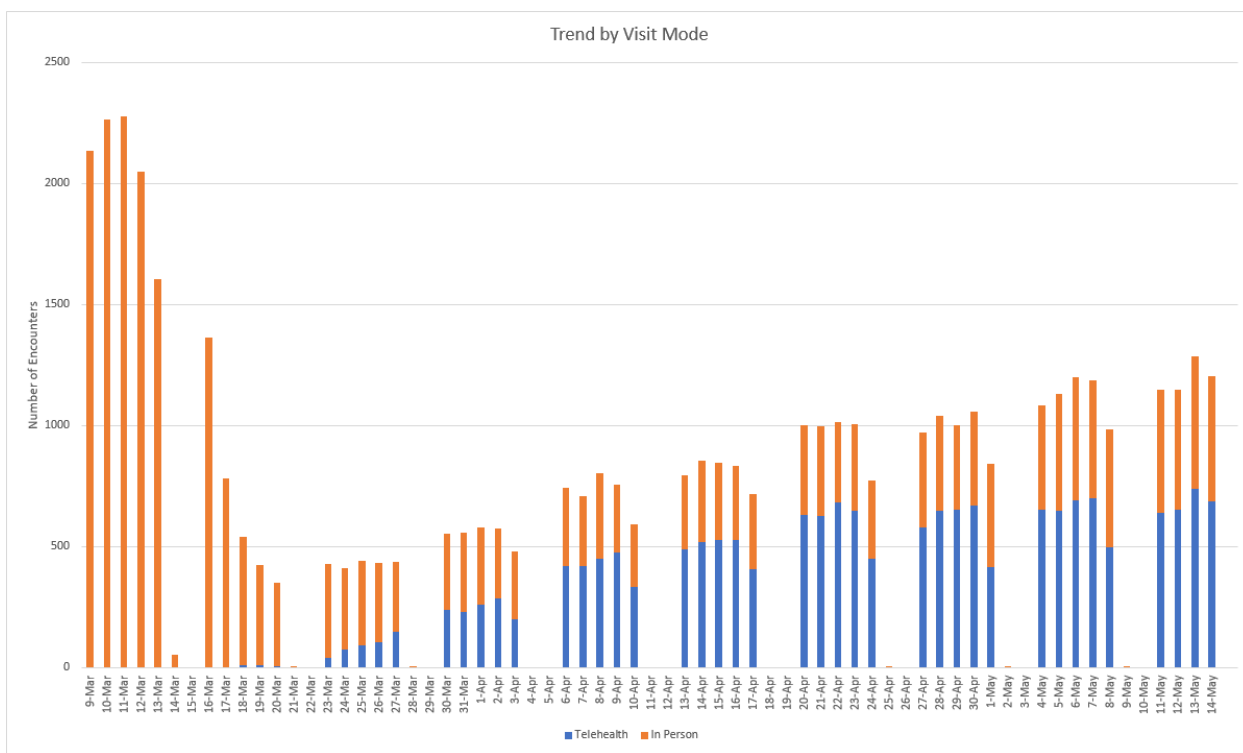


Table 1. Encounter data by visit type and specialty, April 15 – May 12, 2020

Specialty	Total Visit Encounters	Telemedicine Visit Encounters		Encounters In-Person Visits	
	N	n	(% row total)	n	(% row total)
Specialty	15,562	11,192	71.9%	4,370	28.1%
ADHD	258	247	95.7%	11	4.3%
Adolescent	132	77	58.3%	55	41.7%
Allergy	412	362	87.9%	50	12.1%
Cardiology	576	201	34.9%	375	65.1%
Child & Family Therapy	37	34	91.9%	3	8.1%
Cystic Fibrosis	11	0	0.0%	11	100.0%
Dental	66	0	0.0%	66	100.0%
Dermatology	491	407	82.9%	84	17.1%
Developmental & Behavioral	1,590	1,582	99.5%	8	0.5%
Eating Disorders	301	274	91.0%	27	9.0%
Endocrine	1,134	1,015	89.5%	119	10.5%
ENT	711	585	82.3%	126	17.7%
Genetics	194	171	88.1%	23	11.9%
GI	997	962	96.5%	35	3.5%
Gynecology	74	51	68.9%	23	31.1%
Hearing & Speech	695	574	82.6%	121	17.4%
Hematology/Oncology	641	74	11.5%	567	88.5%
Infectious Diseases	110	77	70.0%	33	30.0%
Nephrology	466	249	53.4%	217	46.6%
Neonatal Follow-Up	200	189	94.5%	11	5.5%
Neurology	1,134	1,057	93.2%	77	6.8%
Neurosurgery	92	0	0.0%	92	100.0%
Nutrition	80	76	95.0%	4	5.0%
Ophthalmology	255	66	25.9%	189	74.1%
Orthopedics	1,326	369	27.8%	957	72.2%
Pain Management	93	52	55.9%	41	44.1%
Plastic Surgery	293	205	70.0%	88	30.0%
PT/OT	1,734	1,066	61.5%	668	38.5%
Pulmonology	234	217	92.7%	17	7.3%
Rehabilitation Medicine	153	119	77.8%	34	22.2%
Rheumatology	247	186	75.3%	61	24.7%
Sleep	306	304	99.3%	2	0.7%
Surgery	199	83	41.7%	116	58.3%
Urology	147	91	61.9%	56	38.1%
Weight Management	173	170	98.3%	3	1.7%

The outcome measure of percent positive overall rating was not significantly different between the two visit modalities. The percent of telemedicine visits with a score of 9 or 10 for overall rating of provider was 87.9%, compared to 83.9% for in-person visits (p-value = 0.07). (Figure 2) The telemedicine top box responses for the person-centered measures were all statistically significantly

higher than in-person visit responses including getting enough information (80.6%, 75.7%, p-value < 0.05), active listening (86.6%, 79.7%, p-value < 0.05), trust in the provider (86.7%, 78.5%, p-value < 0.001) and knowledge of the child’s medical history (78.9%, 58.9%, p-value < 0.0001). The process measures of timeliness of care (70.4% telemedicine, 66.2% in-person, p-value = 0.12) was

not statistically different, but knowing what to do if they had questions (78.6% telemedicine, 73.0% in-person, p-value <0.05) did score statistically significantly higher for telemedicine visits.

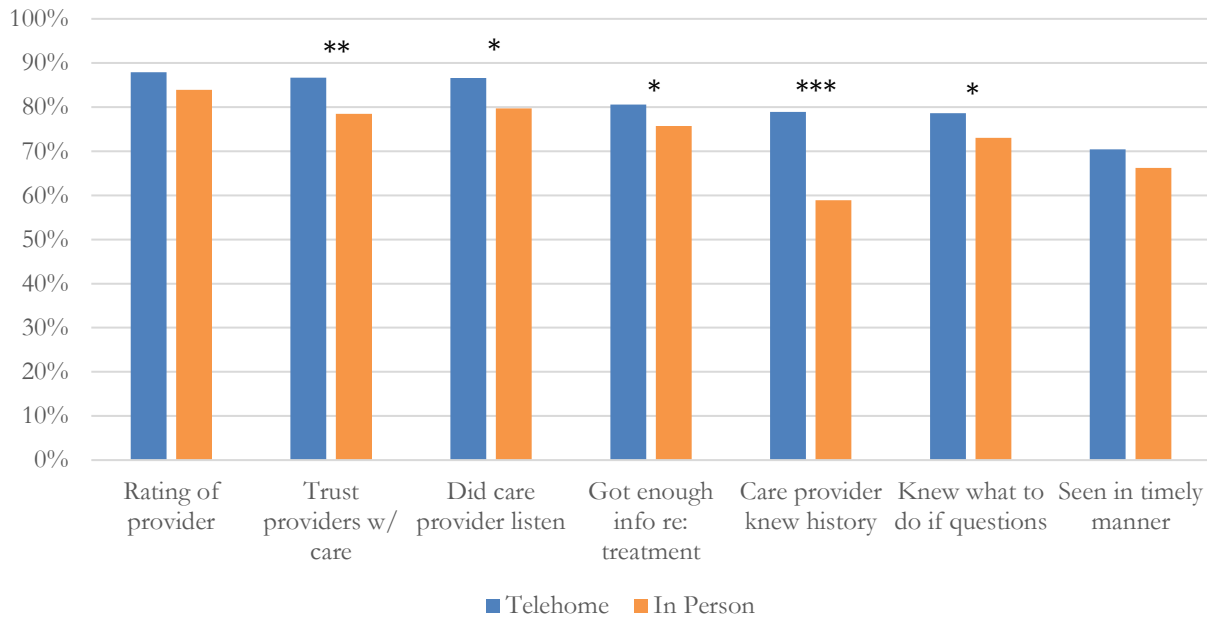
The two telemedicine modality questions are reported in Figure 3. The top box response for telemedicine visit process metrics of ease of use of the telemedicine platform was 63.9%. The likelihood to recommend for telemedicine was 74.3%.

Table 2. Variability in survey return data by visit type and specialty, April 15 – May 12, 2020

	Surveys Returned Telemedicine Visits		Surveys Returned In-Person Clinic Visits	
	n	Return rate	n	Return rate
Subspecialty Care - Total	628	29.20%	603	26.10%
ADHD	18	26.50%	0	N/A (0)
Adolescent Specialty	0	N/A (0)	4	15.40%
Allergy	12	26.10%	8	26.70%
Cardiology	3	23.10%	68	27.10%
Child & Family Therapy	3	30.00%	0	0.0% (1)
Cystic Fibrosis	0	N/A (0)	1	14.30%
Dental	0	N/A (0)	8	16.30%
Dermatology	45	30.40%	18	28.60%
Developmental & Behavioral	117	27.70%	3	16.70%
Eating Disorders	0	N/A (0)	0	N/A (0)
Endocrine	50	29.90%	33	24.80%
ENT	3	23.10%	22	25.60%
Genetics	6	22.20%	5	26.30%
GI	73	26.00%	6	22.20%
Gynecology	2	33.30%	4	23.50%
Hearing & Speech	40	29.60%	24	20.30%
Hematology/Oncology	0	N/A (0)	29	27.40%
Infectious Diseases	1	14.30%	3	17.60%
Nephrology	6	25.00%	14	20.30%
Neonatal Follow-Up	11	21.60%	0	0.0% (5)
Neurology	126	33.20%	7	12.10%
Neurosurgery	0	N/A (0)	6	22.20%
Nutrition	7	43.80%	2	25.00%
Ophthalmology	0	N/A (0)	28	23.50%
Orthopedics	33	27.50%	157	27.20%
Pain Management	0	N/A (0)	0	0.0% (1)
Plastic Surgery	1	25.00%	12	30.00%
PT/OT	0	N/A (0)	34	25.40%
Pulmonology	12	26.70%	1	11.10%
Rehabilitation Medicine	8	27.60%	3	10.70%
Rheumatology	26	41.90%	11	23.90%
Sleep	0	N/A (0)	0	N/A (0)
Surgery	2	40.00%	84	38.40%
Urology	2	28.60%	6	37.50%
Weight Management	21	33.30%	2	33.30%

If no surveys were sent the value is expressed as N/A (0). If a survey was sent, but none were returned the value is expressed as 0% (number of surveys sent).

Figure 2. Overall and process measure positive response ratings



For each measure, percent positive (score of 9 or 10 for rating of provider or “Yes, definitely” for other process measures) shown in blue for telehealth visits and orange for in-person clinic visits. Each measure with a statistically significant higher rating for telehealth visit versus in-patient clinic visits are denoted with (* $p < 0.05$), (** $p < 0.001$), or (***) $p < 0.0001$).

Figure 3. Distribution of ratings for telehealth visit process measures

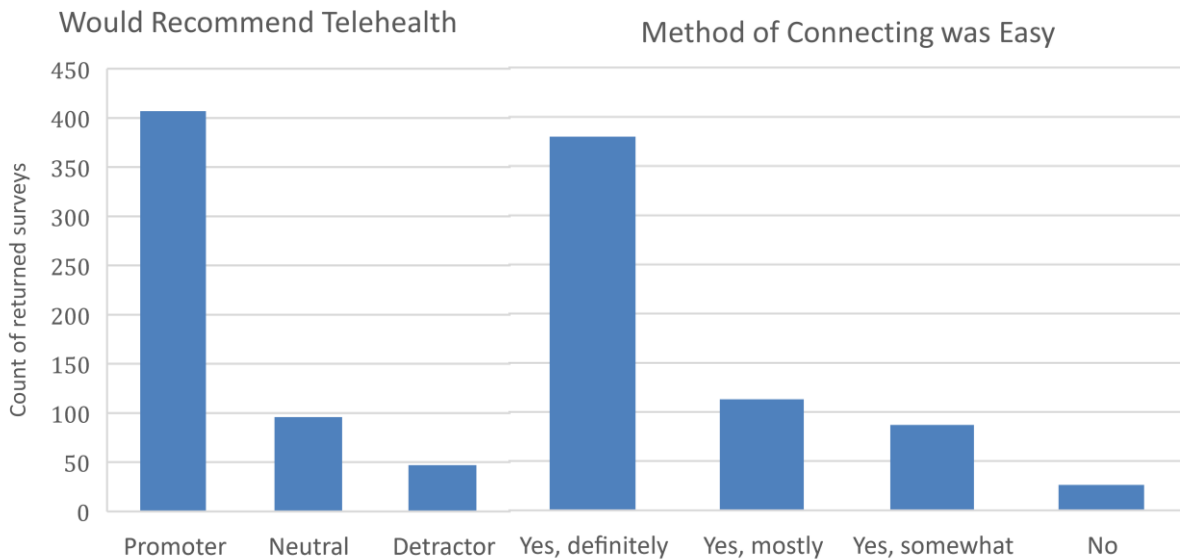


Figure on left: Raw scores on a 0-10 scale for likelihood of recommending telehealth to friends or family were placed into three categories: Promoter (9-10), Neutral (7-8), and Detractor (0-6). Figure on right: Survey responses about ease of using the telehealth platform was scored on a 4-point Likert scale: Yes, definitely; Yes, mostly; Yes, somewhat, or No.

Discussion

The direct to patient telemedicine modality for pediatric subspecialty visits at a tertiary children's hospital was well-received by the population served. The overall rating for the telemedicine encounters was higher than the in-person visits, although not statistically significant. It would make sense that the null hypothesis should not be rejected, as the outcome measure was rating of the provider. The telemedicine encounters and in-person encounters are largely from the same pool of people. For example, the same neurologist or endocrinologist could conduct both in-person and telemedicine visits. Therefore, it would be impressive to see rating of provider differ significantly between the two modalities. The higher provider rating for the telemedicine visit may be supported by the statistically significantly higher person-centered metrics of the telemedicine visits.

Our study was comprised of pediatric specialty patients seen either by telemedicine or in-person visits and the telemedicine cohort rated their experience equal to or better than in-person visits. Several recent studies found similarly high rates of patient satisfaction with telemedicine encounters. A study of telemedicine care by Massachusetts General Hospital showed that “nearly all [patients] perceived the quality of care or communication to be the same or better than at the traditional and familiar office visits.”²⁵ When combining the response options of quality of care via telehealth, 83% of respondents reported it being the same (62%) or higher (21%) than as an in-person visit.⁵ Looking at pediatric specific telehealth, Atanda et al. found that 90% of pediatric sports medicine patients were satisfied with telemedicine care, saved an average of \$50 per visit and regained over an hour in total wait and visit time.⁶ Our tertiary children's hospital cares for a large encatchment area, mostly rural. A previous study by Walsh and Markus found patients who lived farther from the medical campus were more likely to schedule a telemedicine visit.⁷ They also found no statistically significant difference in any outcome measure between telemedicine and in-person visits for their population of patients with rare neurological disease, other than telemedicine visits were shorter by an average of 3.4 minutes ($p=0.01$).⁷ In the Donelan et al. study, 79% of the study participants found it easier to schedule a follow up visit via telemedicine at a convenient time compared to an in-person clinic visit at Massachusetts General Hospital.⁵ Convenience, time savings, financial savings and better access to care are likely reasons patients rate telemedicine highly. In this study of pediatric specialty visits, the modality of patient visit was not the patient or family's choice, rather the provider determined which previously scheduled in-person visits could be converted to telemedicine, which encounters required maintaining the previously scheduled in-person visit, and which visits needed to remain in-person but could be postponed to a

later date to better accommodate the patient, family and staff's safety.

One would think that an in-person encounter would lead to a more ‘personal’ experience. However, all the person-centered measures were statistically significantly higher in the telemedicine visit. Even though they were conducted through a screen, the telemedicine encounters led to perceptions that the provider was more engaged during the encounter. The most impressive difference being the 20% increase in perception that the provider knew the patient's history during telemedicine visits. It is unknown whether the provider prepared more for telemedicine visits, such as reviewing the chart prior to initiating the virtual encounter. Most providers had decreased patient visit loads during the study period (Figure 1) which may have led to more time to prepare for the visits. The providers may have had easier access to the chart during the encounter, verbalizing their review of the chart. The patients seen via telemedicine may have been patients more familiar to the providers, as less first-time consultations were conducted via telemedicine due to the telemedicine scheduling guidelines for the institution.

Even though the person-centered measures scored higher in telemedicine compared to in-person visits, the process measures showed recommendation for the modality was still only 74.3%, potentially influenced by the telemedicine ease of use score at a meek 63.9%. Perception of timeliness of the visit was not statistically significantly different between telemedicine (70.4%) and in-person visits (66.2%) and was the lowest-scored shared process measure. While telemedicine removed some of the burdens to receiving in-person care, the flow of the new modality of telemedicine was still a barrier to the perfect patient experience. The quick ramp up (Figure 1) in use of direct-to-patient telemedicine may have led to variability in quality of care delivery experience. Indeed, the subspecialty clinics had variability in their prevalence of telemedicine use (Table 1) and their previous experience conducting *facilitated* telehealth visits. Monitoring patient experience feedback for telemedicine visits will be imperative as the institution continues to refine the delivery mechanics over this new modality for providers.

There are limitations to this preliminary data. The data only represent a four-week period, and sentiment about medical care may be different during a pandemic. This data is only from pediatric subspecialty ambulatory visits and may not be applicable to adult visits, ancillary services, or urgent/emergent visits. The information technology support and platform used by this institution may not be available in other settings, nor may be the preferred platform. While response rates were similar between in-person and telemedicine in the 20% range, the impact of response bias or demographic difference of the two populations or respondents versus non-respondents is not

known. It is important to recognize that socioeconomic differences may also impact certain patient population abilities to interact with care teams via telemedicine.

Conclusion

In this pediatric health care entity, families rated direct to patient telemedicine visits for pediatric subspecialty visits not statistically different than in-person visits during the COVID-19 pandemic. Even though they were physically distant from their provider, patients and families reported better experience across every person-centered process measure compared to in-person visits. While the timeliness of the visit rating was better with telemedicine, it was not statistically significantly different and continues to be one of the lowest scoring process measures for the clinic specialties. Interestingly, respondents felt the providers knew the patient's history more when the encounter was conducted via telemedicine. With the short study duration, it is unknown whether these results will be sustained or what the standard for clinic visits will be when the clinic spaces can accommodate more patient visits in-person.

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