

# Telemedicine Quality Improvement during the Corona Virus 2019 Pandemic Increases Pediatric Weight Management Access

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**Background:** The corona virus 2019 pandemic disrupted care for pediatric patients with chronic conditions, including those with childhood obesity. Lockdowns forced providers to create new ways of caring for this population. Telemedicine was a promising but previously unavailable solution. This quality improvement report details how the Healthy and Fit Children's Clinic transitioned and improved care via telemedicine. **Methods:** Between March 2020 and April 2021, the quality improvement project team incorporated the Model for Improvement to transition the clinic to telemedicine. The team tracked Healthy and Fit Children's Clinic appointments, no-shows, billing and reimbursement data, and noted unintended consequences or unanticipated barriers. Patients and their families were given a satisfaction survey at the end of each telemedicine encounter. **Results:** Compared with pre-telemedicine implementation, there was a 120% increase in completed patient clinic visits per week and a sustained positive shift above the established baseline. Telemedicine no-show rates achieved <10%, with an average sustained rate of <20%, compared with unchanged in-person no-show rates of >50% pre- and post-telemedicine implementation. There was a 74% increase in monthly billing and a sustained positive shift above the pre-telemedicine baseline. On average, patients rated all six satisfaction questions  $\geq 92$  on the 100-point scale (compared with 83 pre-telemedicine). **Conclusions:** This transition to telemedicine was successful and could be translatable to other clinic sites. Patients attended their clinic visits more consistently and were highly satisfied with their care. In a population where continuity of care is paramount, telemedicine shows promise as a tool to treat childhood obesity. (*Pediatr Qual Saf* 2024;9:e731; doi: 10.1097/pq9.000000000000731; Published online May 9, 2024.)

## INTRODUCTION

Healthcare system burden, public health control measures, and family concerns

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about exposure caused disruptions in care for pediatric patients with chronic health conditions during the COVID-19 pandemic.<sup>1-3</sup>

For many prevalent chronic conditions, such as childhood obesity,<sup>4</sup> continuity of care and establishing a therapeutic alliance between the provider, the patient, and their family is essential.<sup>5-9</sup> In addition, lockdowns during the COVID-19 pandemic created a highly obesogenic environment for children by restricting opportunities for physical activity, healthy eating, and social interaction<sup>10-14</sup> while also exacerbating anxiety, depression, and financial and food security concerns for many families.<sup>15</sup> As a result, children with obesity needed more, and not less, support during the pandemic.<sup>16</sup>

Early in the pandemic, telemedicine emerged as a solution to facilitate continuity of care and sustain patient-provider relationships safely.<sup>17-19</sup> Many health systems did not have the infrastructure or procedures to transition to virtual care quickly. This need necessitated the use of quality improvement (QI) methodology to identify and find solutions to telemedicine challenges and to monitor the impact on access to care.<sup>20,21</sup>

The primary goal of this QI project was to maintain or improve access to pediatric weight management care via

telemedicine in an outpatient clinic during the COVID-19 pandemic so that there were no interruptions in weight management medical services while observing social distancing. Specifically, this project aimed to maintain or increase the number of appointments scheduled and reimbursed, maintain or decrease the patient no-show rate, and maintain or improve patient satisfaction with telemedicine visits relative to pre-telemedicine in-person clinic visits.

## METHODS

### *Context and Pre-pandemic Procedures*

The University of New Mexico (UNM) health system is NM's primary healthcare safety net for families from marginalized populations with systemic, social, and financial barriers to care.<sup>22</sup> The Healthy and Fit Children's Clinic (HFCC) is part of that system, providing outpatient care to children with obesity and cardiometabolic complications in NM since 2009. Children are referred to HFCC by their primary care provider. Before the COVID-19 pandemic, the HFCC clinical team included a physician, a Doctor of Nursing Practice (DNP), and a health educator. They saw patients in person at UNM Carrie Tingley Children's Hospital outpatient clinic with assistance from a dedicated medical assistant (MA), and clerks and nursing staff shared with other outpatient clinics at Carrie Tingley Hospital. Clinic visits occurred 3 days a week, 4 hours daily, with 4 patients scheduled per clinic day. New patients had 1-hour visits, and follow-up patients had 30- to 45-minute visits. Specific barriers to consistent care for many families the clinic serves include a lack of reliable transportation and difficulty accessing Spanish interpretation services for appointment scheduling.

### *Shifts and Challenges During COVID-19 Pandemic*

On March 11, 2020, the first New Mexican tested positive for COVID-19 (<https://www.governor.state.nm.us/2020/03/11/new-mexico-announces-first-presumptive-positive-covid-19-cases/>). Starting March 17, 2020, UNM Hospital outpatient clinics were on limited operations (<http://news.unm.edu/news/unm-plans-campus-return>), shut-down to in-person encounters, and limited to telemedicine visits only in anticipation of the shelter in place order that was issued in NM a week later (<https://www.governor.state.nm.us/2020/03/23/state-enacts-further-restrictions-to-stop-spread-including-stay-at-home-instruction/>). Initially, because of limited infrastructure and technical support, UNM administration only approved telephone visits as an alternative to in-person visits. Video telemedicine visits were only an option if the technology and process were already in place for a clinic before the pandemic. Although the HFCC

initially offered phone visits to their patients, families were not receptive to this type of appointment.

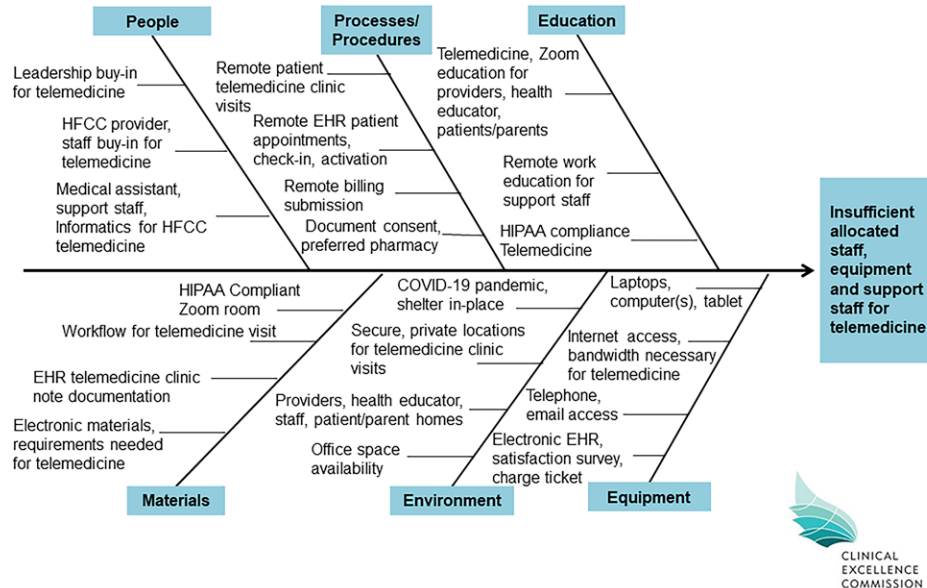
### *Design and Interventions*

The project design incorporated the Model for Improvement, which assumes successful change requires the desire to improve, ideas to improve, and skills to implement changes.<sup>23</sup> From March 2020 to April 2021, improvement efforts were conducted by a QI team that included clinical staff from HFCC and experts in improvement science from a QI resource center within the Department of Pediatrics at the UNM Health Sciences Center (HSC).

Although HFCC was not previously equipped with a telemedicine system, one of the providers (Dr. Vallabhan) had years of experience with implementing telemedicine with rural school-based health center clinics via a Health Resources and Services Administration (HRSA #1H2ARH3037-01-00) grant. She got permission to use HRSA grant funds to offset some of the staff and equipment costs and coordinated the purchase and installation of peripheral equipment. She demonstrated to UNM administration that clinic medical providers could generate a larger insurance reimbursement for a video visit than a phone-only visit, even though both require the same amount of work. This fact made the business case to the UNM administration to allow the clinic to implement video telemedicine. She then led all subsequent aspects of the QI project.

Transitioning to video-based telemedicine appointments meant redesigning nearly every aspect of HFCC care provision. The telemedicine model was implemented using the QI methodology. Using a Cause-and-Effect Fishbone diagram (Fig. 1), the QI team determined that the MA could not accomplish all of the telemedicine tasks within the time she had dedicated to HFCC. Additional equipment (eg, telemedicine peripherals, laptop computers, cell phones to contact patients remotely) and support staff (eg, front-end clerks to check in patients remotely, information technology [IT] support staff to assist patients with accessing video conferencing [Zoom Video Communications, San Jose, Calif.]) would be needed for the process to be implemented efficiently. A key driver diagram (Fig. 2) was used to guide the project, identifying the primary drivers necessary for change to accomplish the aims, which included participation from the HFCC MA, patients, providers, IT, Carrie Tingley Hospital outpatient clinic and leadership, and the QI resource center within the Department of Pediatrics.

Multiple iterative, convergent Plan, Do, Study, Act (PDSA) cycles were used to test and refine the telemedicine processes (Table 1). Small-scale PDSAs informed clinical workflow processes, starting with one patient, provider, and clinic day; processes were tested and refined with each subsequent patient and provider, and lessons from one cycle informed the next. Initially, cycles were conducted to gain leadership buy-in to implement telemedicine. Then, several



**Fig. 1.** Cause-and-Effect Fishbone diagram for a Telemedicine QI Project at the Healthy & Fit Children's Clinic. HFCC, Healthy & Fit Children's Clinic. EHR, electronic health record. HIPAA, Health Insurance Portability and Accountability Act; COVID-19, corona virus disease 2019. Source of diagram template: Clinical Excellence Commission, <https://www.cec.health.nsw.gov.au/CEC-Academy/quality-improvement-tools/cause-and-effect-diagrams>.

implementation efforts were conducted in parallel. The first effort involved the process of parent/patient clinical consent to be treated. For this effort, the team developed a telemedicine consent and consenting process. The second effort involved system changes. This included efforts related to clinic workflow and patient access to the telemedicine platform. To establish clinic telemedicine processes, cycles focused on developing the telemedicine clinic workflow, activating Zoom, establishing the process for document sharing via Zoom with parents/patients, and developing and implementing a preclinical "to-do" list were completed. To ensure patient access to the telemedicine platform, the team wrote Zoom patient instructions that explained how to access and participate in the video-based telemedicine session. The third effort involved staff workload allocation and training. This included allocating staff time to activate and discharge patients in the electronic medical record remotely and training them on the process. The final effort involved billing and reimbursement and included developing a telemedicine billing charge ticket and establishing a workflow for submitting it electronically.

The clinic had a dedicated MA during telemedicine clinic hours and relied on remote technical support staff. Patients were sent a UNM HSC-issued HIPAA-compliant Zoom link to their appointments, and providers used UNM HSC-issued password-protected laptops for the encounters. In collaboration with UNM Hospital administration, the HFCC identified billing codes and developed charge sheets for the HFCC telemedicine visits.

The Revised Standards for Quality Improvement Excellence (SQUIRE 2.0) guidelines were used to prepare this article.

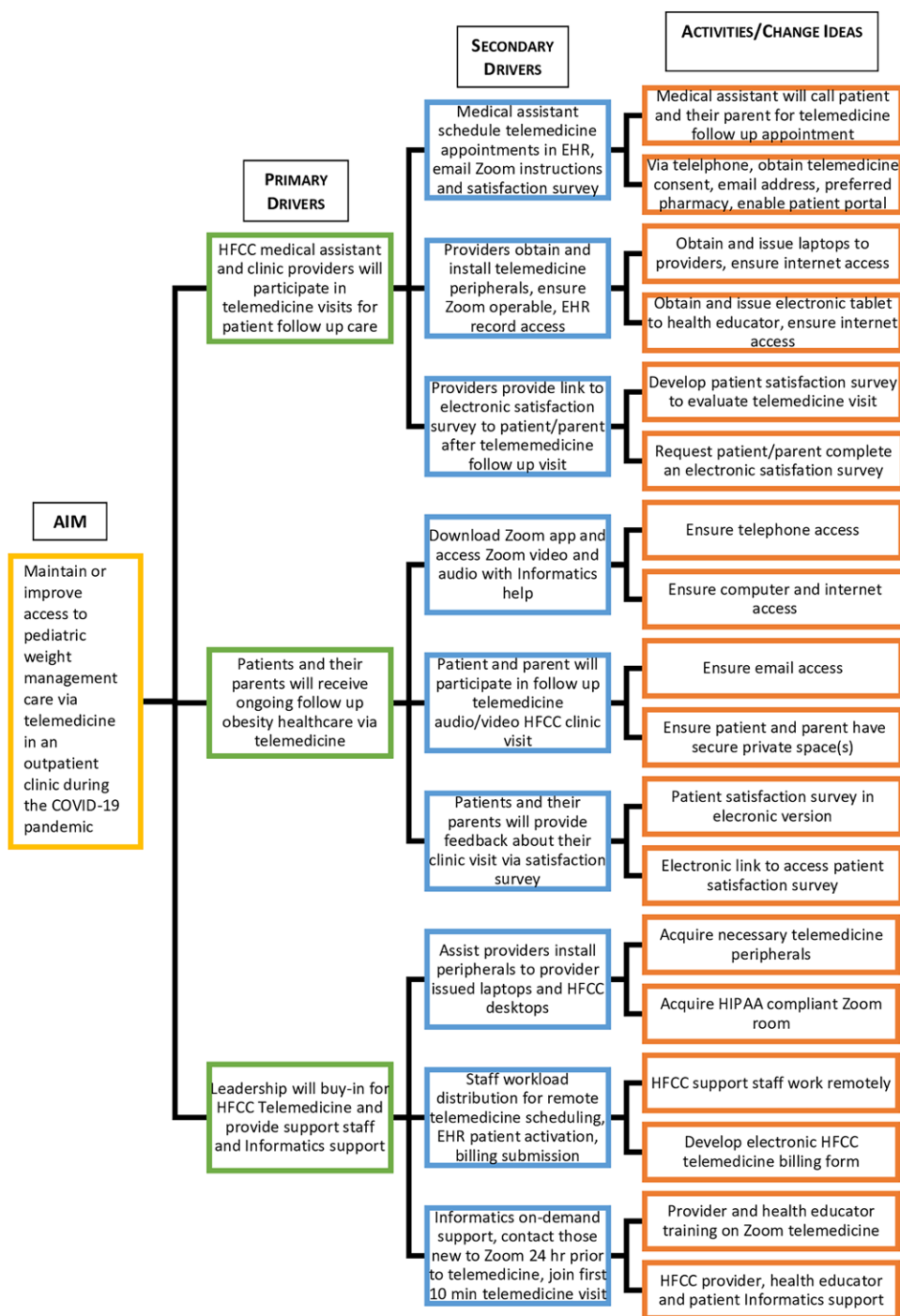
### *Ethical Approval*

The University of New Mexico Health Sciences Center Human Research Review Committee approved the project protocol (approval no.: #17-275). The patient satisfaction surveys used passive, opt-out consenting.

### *Study of the Interventions and Measures*

#### **Clinical outcome measures**

The QI team tracked HFCC clinic appointments (from January 2020 to March 2021), no-shows (from August 2019 to November 2020), telemedicine no-shows (from April 2020 to November 2020), and billing and reimbursement data (from April 2019 to March 2021) in Excel spreadsheets (Microsoft Excel for Microsoft 365, version 2201, Redmond, Wash.) that were frequently updated and cross-checked through medical record reviews and review of billing and reimbursement data pulled from Athena software (Athenahealth, Inc and Virence Health, 2019); inconsistencies were corrected. A clinic appointment indicated that the patient and caregiver attended a clinic appointment via telemedicine with either the DNP or the MD. The team did not report clinic patient appointments before January 2020 because the average remained constant from August 2019 to January 2020. Also, the team did not



**Fig. 2.** Key Driver Diagram for a Telemedicine QI Project at the Healthy & Fit Children's Clinic. EHR, electronic health record. HIPAA, Health Insurance Portability and Accountability Act. Source of diagram template: Texas Department of State Health Services, <https://www.dshs.texas.gov/hiv-std-program/ryan-white-program-specific-clinical-quality-management-resources-tools>

track other outcomes and could not track no-shows after November 2020 because the process for rescheduling changed (the patient's name was removed from the clinic schedule during the rescheduling process). For reimbursement, the QI team looked at reimbursements for the month and determined the high and low reimbursement amounts linked to the billing charges paid for 3 months. This review was done instead of

collecting complete reimbursement data because there is a lag (sometimes up to 4 months from the time of billing) in reimbursements collected.

**Process measures**

The QI team recorded HFCC healthcare provider and MA, technical support staff, and IT staff hours dedicated to HFCC telemedicine appointments and QI efforts.

**Table 1. Summary of Plan, Do Study, Act (PDSA)\* Cycles Conducted during a QI Project for Weight Management Care Continuity**

PDSA Focus	Cycles	Change Ideas Tested
Leadership buy-in to implement telemedicine	10	1. Presented power point with evidence from the literature for use of telemedicine appointments for weight management acceptability and efficacy—adapted and revised to include reimbursement information viability from previous telemedicine studies done, adopted
Telemedicine consenting	Ramps † 2	1. Telemedicine consent developed—adopted
Telemedicine clinic workflow	Ramps 2	2. Process for telemedicine consenting—adopted
	35	1. Telemedicine Clinic Workflow—adopted
	Ramps 3	2. Zoom activation & document sharing (with patients during Zoom clinic visit) workflow—adopted
Zoom platform for telemedicine visits	11	3. Pre-clinical “To Dos” Workflow—adopted
Staff workload ‡	Ramps 2	1. Zoom access for patients—adopted
	10	2. Zoom patient instructions—adapted, adopted
	Ramps 2	1. Train additional staff to remotely activate patients in the electronic medical record (which activates the patient as present for the Zoom clinic visit)—adopted
Billing and Reimbursement	20	2. Train staff to discharge patients out in the electronic medical record—adopted
	Ramps 2	1. Billing charge ticket for telemedicine—adopted
		2. Workflow for submitting billing charge ticket electronically—adopted

\*A complete PDSA included small-scale testing of a change idea from start to finish—planning how to test the change, testing it, observing what happens, and then deciding on next steps, which can include adopting the change, adapting it, and then testing it with additional PDSA cycle(s), or abandoning it.

†A ramp is a set of related PDSA cycles that build on each other to refine the change being tested.

‡Determined from a Fish-Bone Cause & Effect Diagram.

### Balancing measures

The QI team identified measures of unintended consequences or unanticipated barriers, including staff illness, competing staffing priorities, clinic hours, and language access. The team also experienced low staff buy-in and siloed work.

### Satisfaction survey

The satisfaction survey was developed *de novo* based on patient feedback from another similar QI project. Patients and/or their parents/guardians were asked to respond to the following questions by rating their response on a scale of 0 (lowest) to 100 (highest) that was anchored at each end and specific to each question: How do you feel visiting with your doctor or nurse using telehealth? How well can you understand your doctor or nurse on this telehealth visit? How easy is talking to your doctor or nurse at this telehealth visit? How sure are you in using your care plan after this visit? How sure are you that you can manage your condition after this visit? How happy are you with this telehealth visit? For patients less than 12 years old, the parent or guardian responded to the satisfaction survey questions. For patients 12 years or older, the patient and the parent or guardian would respond together. Clinic staff collected patient satisfaction surveys in English or Spanish using the REDCap electronic data capture tools hosted at UNM.<sup>24</sup> The provider did not remain in the Zoom room while the patient and parent completed the survey to reduce the risk of pressure to respond in a certain way.

### Measure and Survey Analysis

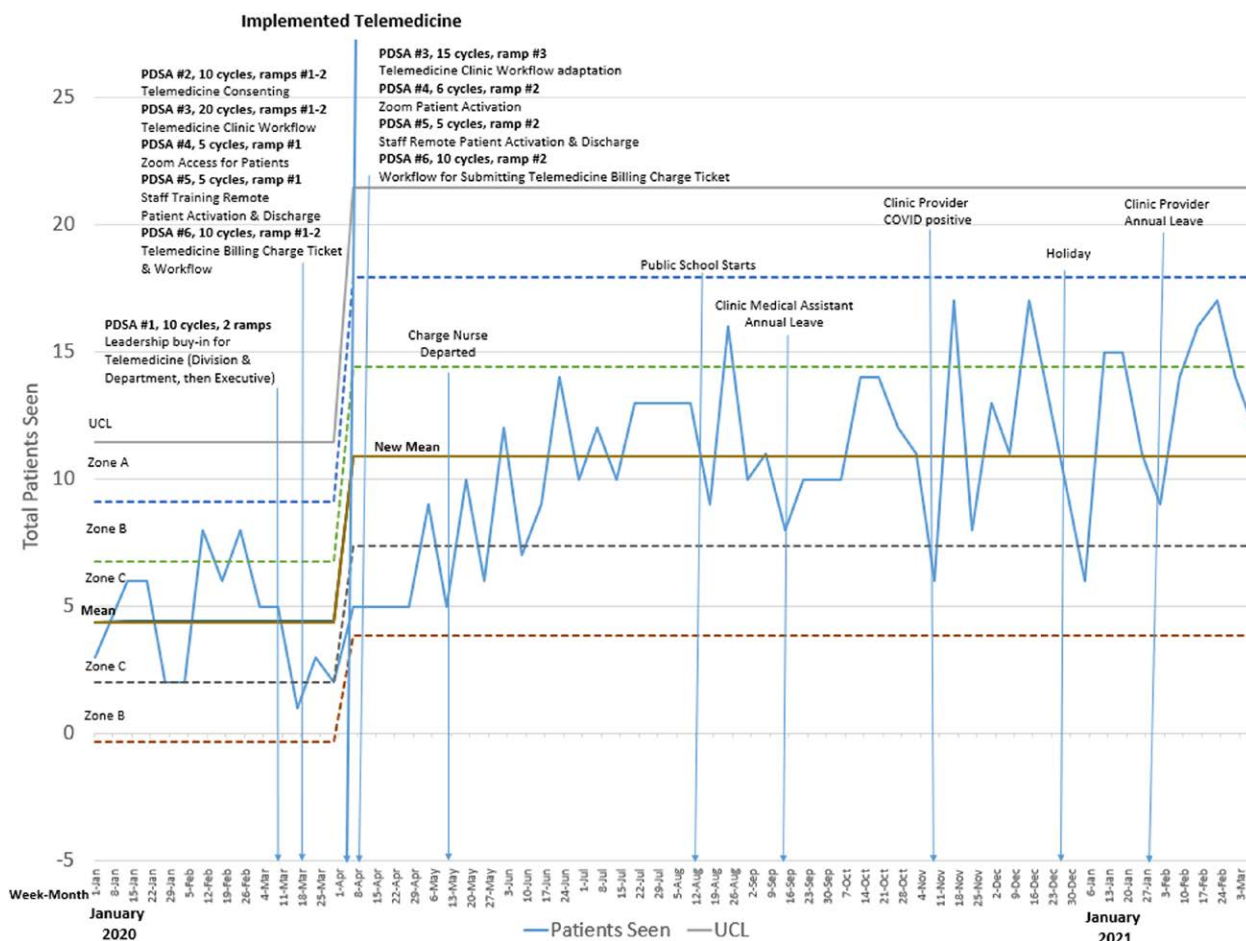
Measures and survey data were descriptively analyzed and/or graphed as run or control charts in Excel.

## RESULTS

The first HFCC video telemedicine appointment was on April 6, 2020, less than 1 month after the first COVID-19 case. By June 2020, the telemedicine HFCC clinic expanded capacity beyond the original in-person model, scheduling 5 patients in 5 half-day clinics, 5 times per week, with both clinicians. Compared with the pre-telemedicine implementation, in-person-only patient clinic visit timeframe from January 2020, there was a 120% increase in completed patient clinic visits per week and a sustained positive shift above the established baseline after implementing video telemedicine from April 2020 to March 2021 (Fig. 3). From August 2019 to November 2020, in-person no-show rates were as high as 64% before the pandemic, with an unchanged average pre- and post-telemedicine implementation just above 50% compared with telemedicine no-show rates starting April 2020 as low as 7%, with an overall sustained no-show average rate less than 20% (Fig. 4). A 74% increase in total monthly billing and a sustained positive shift above the established pre-telemedicine baseline (Fig. 5). The high and low reimbursement amounts linked to the paid billing charges were consistent with the highs and lows paid pre-telemedicine implementation for in-person clinic appointments.

Therefore, the overall reimbursement amount increased because the number of clinics increased after implementing telemedicine.

Forty-six patients aged 5–17 years completed satisfaction surveys; seventeen were monolingual Spanish speakers. On average, patients rated all six satisfaction questions  $\geq 92$  on the 100-point scale. Although the surveys are not directly comparable, 83% of HFCC families that completed the Press-Ganey patient satisfaction survey (universally mailed home) answered, “How satisfied



**Fig. 3.** Healthy & Fit Children’s Clinic Control Chart illustrating the impact of a telemedicine intervention on the number of patients seen from January 2020 to March 2021. UCL is the upper control limit.

are you with your provider?” by noting they were satisfied or very satisfied with their provider before the pandemic.

Team tracking of balancing measures was important to identify factors negatively impacting patient clinic visits. The need for more staff was addressed by increasing the work hours allocated to the current clinic team. An unanticipated barrier during the project was the need for more language access. IT staff interfacing with families to connect to the HFCC video telemedicine virtual room needed to be fluent in Spanish. As a result, the bilingual HFCC providers needed to interpret this step, adding to the time they dedicated to each visit. Some families did not have computers, but all had at least a cell phone to access the virtual room, and connectivity was generally stable.

**Sustainability**

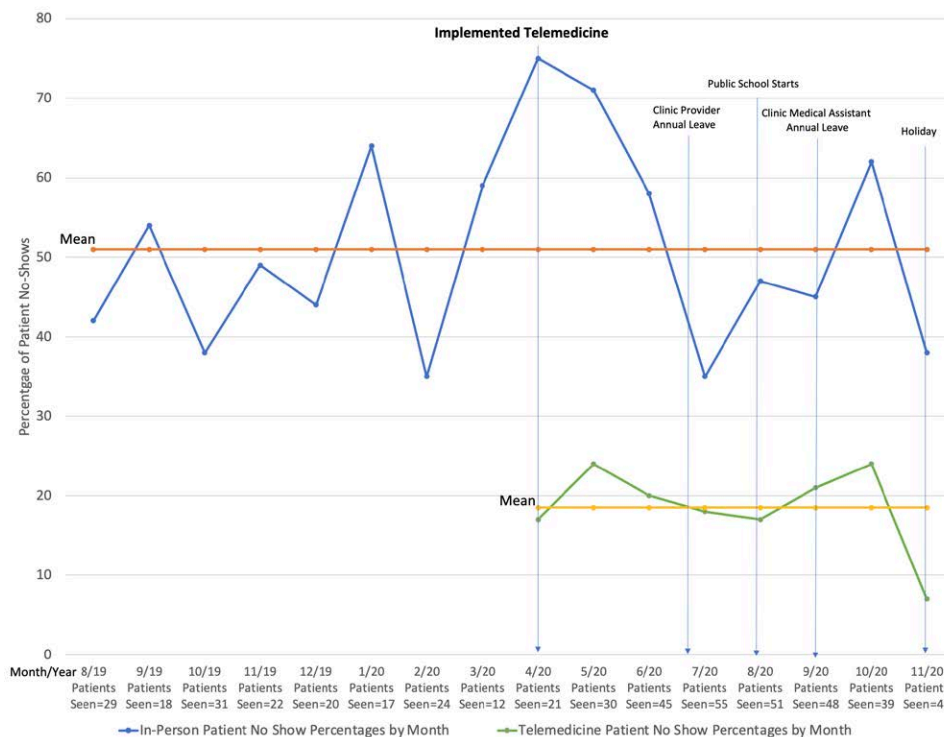
Given the efficacy of the telemedicine model, HFCC will continue to offer it as an alternative to in-person follow-up patient visits during regular clinic hours.

**DISCUSSION**

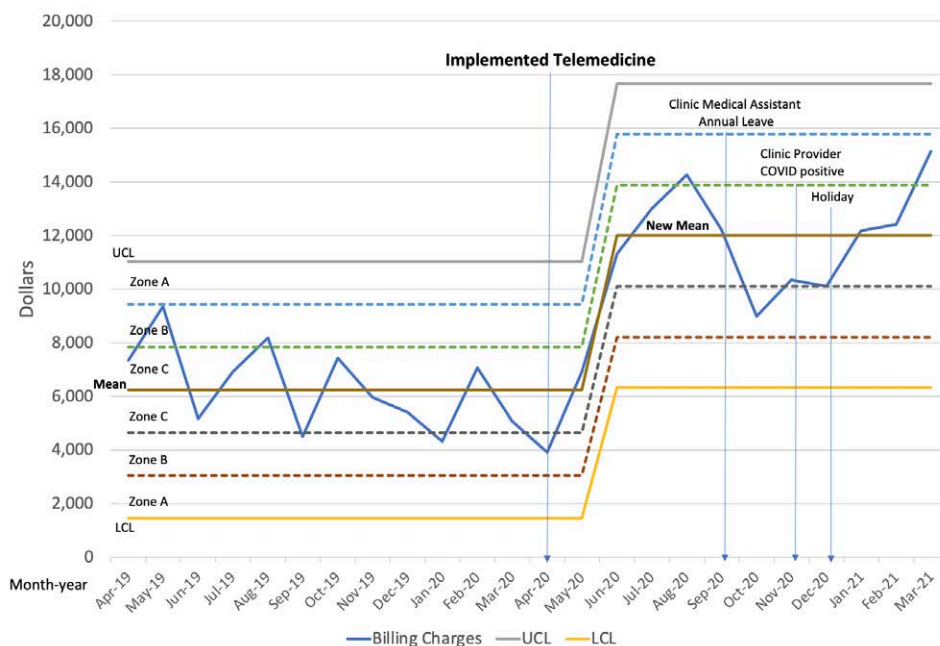
The HFCC team successfully used the QI methodology to transition to video telemedicine at the outset of the

COVID-19 pandemic. After implementing telemedicine, patient volume increased, no-shows decreased, billing and reimbursement increased, and patient satisfaction increased compared with pre-telemedicine implementation. This is especially impressive given the widespread disruptions in healthcare services due to the COVID-19 pandemic. Perhaps unsurprisingly, the number of patient clinic visits increased because additional clinic hours were added. However, adding clinic hours would not have been an option and would not have been sustainable if patients did not attend their appointments consistently because patient no-show rates are considered by hospital administrators when allocating limited space and resources for clinics to be held, suggesting the telemedicine model was mutually beneficial for patients and providers.

Other studies have reported that video telemedicine improved or maintained healthcare access and patient satisfaction.<sup>25</sup> A 2020 systematic review of telemedicine for the management of pediatric obesity noted similar attrition rates for telemedicine compared with in-person cohorts and high patient satisfaction with telemedicine.<sup>26</sup> Similarly, in a study using telemedicine as an adjunct to in-person care for adolescents with complex obesity, youth reported high satisfaction with their



**Fig. 4.** Healthy & Fit Children’s Clinic number of patients seen by month with percentages of in-person patient no-shows vs percentages of telemedicine patient no-shows from August 2019 to November 2020.



**Fig. 5.** Total Healthy & Fit Children’s Clinic Billing Charges in U.S. Dollars April 2019–March 2021. UCL, upper control limit; LCL, lower control limit.

experience.<sup>27,28</sup> Before the COVID-19 pandemic, the implementation of telemedicine technology was stagnant. However, as seen in related studies, the pandemic created the momentum necessary to implement telemedicine rapidly and to demonstrate the benefits of this healthcare delivery approach.<sup>29</sup> The challenges noted

in this QI project and the changes and ideas developed and tested by the team mirror those noted in other telemedicine QI projects with pediatric patients conducted before and during the pandemic. Key challenges highlighted by other projects also included low staff buy-in, siloed work, insufficient allocated work hours for the

front-end staff, low health system capacity to support the implementation of video telemedicine, and limited health system experience with billing for video telemedicine.<sup>19</sup> Despite these challenges, billing and reimbursement increased after implementing telemedicine in the current project. However, inconsistencies with billed charges and the amount reimbursed were found, which historically has been common.<sup>30</sup> Factors that supported the success of video telemedicine implementation included a “champion” provider (the clinic DNP) who was experienced with the telemedicine implementation process and adept with speaking to administrators about billing and reimbursement, external grant funds to support additional staff time and telemedicine equipment, and collaboration with technical support, IT, and interpreter staff to decrease digital literacy and language barriers for families.

An unexpected benefit of the video telemedicine format was the intimate bond that formed between clinicians and entire patient families. The patient’s whole family could be included in the telemedicine visit. One remarkable example was a visit that included a patient living with his grandparents in Mexico and his parents in Albuquerque. The pandemic separated the family, but telemedicine allowed his care to stay on track and support to continue. Because of limited interruptions and increased continuity of care, the team became some families’ only connection to medical care. They could continue to manage patients’ weight and triage for any COVID-19 symptoms that would have been missed with delays in access to primary care. In addition, providers could monitor and address families’ social drivers of health (eg, food insecurity), which became an increasing concern during the pandemic. Similarly, Austin et al reported that using telemedicine outreach to evaluate social drivers of health in older adults early in the COVID-19 pandemic led to more timely intervention and decreased emergency room visits compared with patients who did not receive outreach and intervention.<sup>31</sup>

The HFCC uses a hybrid model, offering patients a mix of in-person and telemedicine visits. Hybrid care is ideal, as in-person physical examinations are needed to assess for obesity-associated comorbidities. In particular, physical examinations are useful to identify tonsillar hypertrophy associated with obstructive sleep apnea, papilledema associated with idiopathic intracranial hypertension, wheezing associated with asthma, hepatosplenomegaly, and orthopedic comorbidities. However, maintaining telemedicine as a complementary form of care can decrease time and transportation barriers for families and improve patient visit attendance and satisfaction. Telemedicine also allows the care team to see inside the family home to tailor their recommendations to the family’s accessible resources. It reinforces strong family support, which can help keep the child on the path to effective weight management and fewer chronic health conditions.

When maintaining video telemedicine as a care option, it is important to consider internet and technology access limitations. Telemedicine care may have been more accessible during the pandemic because public schools transitioned to virtual learning and provided families with free or discounted technology and internet access. It is still being determined if such access will continue to be available.<sup>32</sup> However, empirically, internet and technology access has been fine thus far.

This QI project had some limitations. It only collected clinic visit and billing information, was conducted with a small patient population at one clinical site, and it was impossible to determine a response rate for the satisfaction survey, meaning the results may not be generalizable. However, this is the only NM clinic dedicated to childhood obesity treatment. Consistent with QI methodology, small-scale testing with as few as five patients is recommended before scaling up to inform larger projects. This helps avoid financial waste resulting from complications that may emerge during testing. Although the project was conducted in one geographic location, the process could be implemented in other clinical settings using QI methods to adapt to the specific clinical sites.

## CONCLUDING SUMMARY

This QI project arose out of a desperate situation. With the onset of the COVID-19 pandemic, an already vulnerable population became even more at risk of poor health outcomes, and the clinic used QI to implement telemedicine care rapidly. A hybrid in-person/telemedicine clinic format is now in place, as telemedicine barriers were surmountable with QI effort, and telemedicine positively impacted clinic volume, attendance, reimbursement, and patient satisfaction compared with pre-telemedicine implementation and in-person-only care. The QI process used to implement telemedicine in this clinic is potentially translatable to other pediatric outpatient clinics.

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