Managing the COVID-19 Pandemic Using Quality Improvement Principles: A New York City Pediatric Primary Care Experience

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INTRODUCTION

The clinical impact of COVID-19 was swift as cases spread throughout the country, and NYC became the epicenter. As COVID-19 cases increased, pediatric primary care practices faced increased challenges, including staff and clinician redeployment to critical inpatient areas, shortages of personal protective equipment (PPE), and workforce exposures and illness. These challenges led to a whole-scale reorganization of outpatient sites to maintain safety for patients and staff. Simultaneously, several area primary care practices closed, leaving families without a medical home.

To meet these challenges, the pediatric ambulatory care faculty used quality improvement (QI), including a focus on systems and processes, addressing safety, a team approach, and the use of data-driven change, to adapt to this rapidly evolving situation. At the same time, the Centers for Disease Control and Prevention and the American Academy of Pediatrics also began offering guidance on strategies for healthcare facilities during the pandemic.

METHODS

This report is a descriptive study that demonstrates the use of QI methodology to rapidly implement and adopt...
changes in primary care workflows to provide preventative and urgent care in the face of the COVID-19 pandemic.

Setting
The West Campus Ambulatory Care Network of New York-Presbyterian Hospital provides ambulatory care for families in the Northern Manhattan and Bronx neighborhoods. Primary care pediatrics and adolescent medicine consist of 4 practices with 28 faculty and 4 fellows providing direct patient care and the supervision of 78 pediatric residents during weekly continuity clinics. The cumulative practice panel size of all 4 sites, including adolescent medicine, is approximately 19,000 patients. Patients are primarily Latino and publicly insured.

In addition to the primary care practices, a Newborn Clinic (NBC) provides a one-time outpatient newborn visit following nursery discharge. This clinic has approximately 2,000 visits annually, within 3–5 days of life, for newborns who are publicly insured or lack insurance. Along with 2 dedicated pediatric providers, the NBC lactation consultant offers lactation support for new mothers.

QI Methods
We developed a key driver diagram, identifying the anticipated drivers of change, with a stated aim to provide preventative and urgent care to our primary care patients in the face of closures and social distancing during the COVID-19 pandemic in NYC (Fig. 1). Using Plan-Do-Study-Act (PDSA) cycles, an outpatient pediatric leadership group addressed these drivers and trialed new workflows for care delivery. The group met weekly to review PDSA cycles (Table 1) and determine the next improvement cycles.

Consolidation of Practices
Because of the rapid transmission of COVID-19 among healthcare workers and patients, a decision was made to consolidate pediatric practices to 1 location. In contrast, other service lines were consolidated to other sites. This change gave us a larger footprint at a single practice site to see patients in person and manage all aspects of pediatric and adolescent outpatient care plus accommodate newborn clinic. All aspects of the clinical care structure and associated workflows underwent alterations during consolidation (Fig. 2). Many factors played into the decisions regarding consolidation, including a limited supply of PPE for our public-facing staff, workforce redeployment, and overall staff health and safety. The site chosen for consolidation had the advantage of both being located closest to the hospital and having an adequate number of examination rooms for our needs.

Residents were redeployed to the inpatient services, whereas 3 faculty members were redeployed; 1 to the newborn nursery and 2 to a newly created newborn clinic for infants born to SARS-CoV-2 positive mothers.7 The remainder of the faculty continued to work in their usual roles, assuming clinical responsibilities for faculty and resident patients while also transitioning to increased telehealth care. Faculty rotated through roles in well-child care, urgent care, and telehealth. Dedicated newborn and adolescent faculty maintained their practices, with few general pediatric faculty assisting with coverage in the newborn clinic.

Reorganization of In-person Care
Well-child Care Delivery. Limited, provider-agnostic, well-child care templates were created to enable any provider staffing the site to see patients, which promoted patient flow and decreased wait time. We prioritized the age group of 13 months and younger for well-child care appointments, given the high volume of COVID-19 cases in New York City and the large patient panel in the 1- to 2-year age group in our practices. The American Academy of Pediatrics disseminated recommendations to see patients 2 years and under in late April, after our consolidation. We did not modify in-person visits based on this recommendation to ensure that social distancing was maintained.8 Staff moved patients’ appointments from each of the 4 sites to the new consolidated practice. As demand for well-child visits increased, templates expanded on days that space allowed.

Adolescent Care. The adolescent service line transitioned all appointments to telehealth; however, a provider was present for urgent in-person needs such as pregnancy testing or infection testing and treatment.

Newborn Care. The NBC integrated into the consolidated practice. We expected higher than usual volumes due to community practices’ closure and the need to provide follow-up visits for ongoing issues typically monitored at the primary care practices, such as breastfeeding difficulties, weight checks, and bilirubin monitoring. The NBC lactation consultant provided both on-site and telelactation support to breastfeeding dyads.

Addressing Urgent Care Needs
We established limits on in-person pediatric urgent care and parameters for appropriate telehealth visits to reduce infection spread. Patients were encouraged to call for a nurse- triage and scheduled a telehealth visit to address concerns if needed through messaging. As a group, we developed consensus guidelines to identify patients to be seen in-person. Those patients were assigned specific appointment times on a designated template for urgent visits. Given the low demand for in-person urgent care, providers were quickly moved to staff an expanding telehealth pool.

Growth of Telehealth
Nationally, the COVID-19 public health emergency prompted a partial or complete shift to telehealth for many organizations and practices.9 Before the pandemic,
telehealth was still in a pilot phase in our division, being orchestrated by 1 telehealth champion. We rapidly expanded our telehealth capabilities to accommodate acute care concerns and follow-up needs. Visits were separated into COVID and non-COVID-related concerns and triaged into respective templates. Repurposed staff supported patient portal enrollment and dedicated additional time to adequately prepare families with low technology literacy. Patients accessed visits through smartphones or tablets. In New York City, smartphone ownership is common, even among lower-income residents, and the public schools distributed tablets to their students to assist in remote learning. Wi-fi connectivity or device availability was not found to be a significant barrier. As the EMR rolled out immediately before the pandemic, the patient portal was not available in Spanish until several weeks into consolidation, limiting some usability in the beginning. Physicians were trained in telehealth principles, including tips for virtual physical exams, the camera’s appropriate positioning for optimal view of patients and their homes, documentation, billing, and faculty supervision of resident-led visits. As the breadth of patient concerns and indications for telehealth increased, telehealth access increased, with providers moving off-site by the second month to maintain social distancing as they became more comfortable with the modality.

Community/Patient Outreach
Patient outreach was coordinated with the hospital communications team via mass text messaging and letters, and local team efforts through previsit calls. Separate efforts were made by physicians, nurse care managers, and population health volunteers to communicate with families of children with special healthcare needs (CShCN) and enroll them in the patient portal. By partnering with local and national media, we emphasized, in English and Spanish, the importance of vaccinating children throughout the pandemic, seeking care for urgent conditions, and newly available telehealth options. At the pandemic’s height, one of our pediatricians appeared and wrote for national and local media daily.

Linkage to Social and Mental Health Needs
Social workers and mental health providers worked remotely to provide service for new consults and existing patients. A separate virtual support team worked to prescreen patients for maternal depression and social determinants of health.

Team Communication
We made multiple efforts to ensure clear communication and integration with arriving team members at the consolidation site. One of the 4 pediatric medical directors was assigned daily to help the team adopt new workflows, problem-solve, and monitor scheduling accuracy. In response to concerns over too many workflow changes, we added rolling summary emails regularly to share new workflows, useful tips, schedule changes, and successes.
Table 1. Summary Table of PDSA Cycle details

| Week | Date       | Reorganization of In-person Care | Addressing Urgent Care Needs | Growth of Telehealth | Community/Patient Outreach | Linkage to Social and Mental Health Needs | Team Communication | Promoting Safety for Patients and Staff |
|------|------------|----------------------------------|------------------------------|----------------------|---------------------------|----------------------------------------|-------------------|----------------------------------------|
| 1    | March 30, 2020 | Centralized nursing and administrative EMR messages | Restricted well-child care to younger than 13 mo of age | Implemented new triaging algorithm to determine telehealth vs in-person visits | Created separate templates for COVID-19 vs non-COVID-19 complaints | Globally messaged patients via text and letter regarding practice consolidation and how to access care | - Implemented routine medical director email communications | - Instituted greater role for COVID-19 screening |
|      |            | Created new workflows for ED/Inpatient/NICU discharges | Created generic shared templates | - Implemented PPE protocol | | | | - Utilized medical assistants to escort patients directly to examination room |
|      |            | Designated one NP to address home care orders, prescription requests and forms | - Maintained in-person NBC visits | - Started SW and Nurse Care Manager outreach to medically complex and high-risk families | | | | - Cleaned rooms before and after visits |
|      |            | Created back-up call for providers who were out sick | - Converted adolescent visits to telehealth | | | | | - Implemented PPE protocol |
| 2    | April 6, 2020 | Expanded well-child care access | Utilized urgent care space for families with COVID-19 symptoms upon screening | - Started virtual workflows for WIC and EI | | | | - Designed separate locations for well care and sick care |
|      |            | Expanded adolescent care access | - Established workflow for social work, mental health, and nurse care management | | | | | - Allowed one telehealth provider to work off site |
| 3    | April 13, 2020 | Developed workflow to schedule telehealth visit after evening or weekend call | Sent no show notes for missed appointments | - Repeated global outreach | | | | - Reinforced universal masks use and hand hygiene for in-person visits |
|      |            | | | - Clarified availability of WIC, EI, and food bank services | | | | - Started nursing telephone pre-screening for COVID risk factors and shared new visitor policy |
| 4    | April 20, 2020 | Expanded adolescent in-person visits up to age 30 | Expanded telehealth access | Patient portal converted to Spanish | | | | - Rescheduled appointments for patients who screened positive for potential COVID-19 symptoms or exposures at the door |
|      |            | | | - Expanded telehealth access | | | | - Obtained medical history by phone before entering examination room for in-person visits |
|      |            | | | - Clarified billing for use of E&M codes for virtual care visits | | | | - Added practice safety assurance to nurse pre-screening phone calls |
| 5    | April 27, 2020 | Increased well care access | - Developed documentation and billing for phone visits when video not possible | - Patient portal converted to Spanish | | | | - Developed guidelines for telehealth providers working off site |
| 6    | May 4, 2020  | Implemented virtual transition of care workflow for CSHCN for graduating residents | Integrated returning resident into outpatient care | - Patient portal converted to Spanish | | | | - Increased number of telehealth providers working off site |
| 7    | May 11, 2020 | Implemented virtual transition of care workflow for CSHCN for graduating residents | Educated clinicians about newly recognized COVID-19 multisystem inflammatory syndrome | - Patient portal converted to Spanish | | | | - Increased number of telehealth providers working off site |

ED, emergency department; EI, early intervention; NICU, neonatal ICU; WIC, women, infant and children.
Promoting Safety for Patients and Staff
Multiple new approaches to manage safety were rapidly trialed and implemented. Our new physical space was reimagined to separate sick visits from well care, keep the waiting rooms empty, and maintain social distancing. One day prior, nurses called to confirm scheduled appointments, prescreen for COVID-19 symptoms and risk, address any safety concerns and review the visitor policy that only 1 parent/guardian could accompany the patients to visits. The practice identified a single entrance for use. Upon arrival, a greeter (provider or nurse), wearing PPE, again screened each family or patient for COVID-19 symptoms currently or in the past 2 weeks. Screeners instructed families to don masks and use hand sanitizer upon entering the practice. All staff members who engaged in direct patient care wore appropriate PPE. Patients were registered virtually, and medical assistants brought patients directly to the examination rooms. Providers dialed into examination rooms to obtain histories and review care plans with families before the examination. Vaccinations occurred in the examination room, and patients were discharged directly from the examination room. Environmental services cleaned the site regularly to offer a reassuring environment.

Measurements and Analysis
Our overall goal was to maximize in-person visit volume in a consolidated space and augment it with telehealth visits. Our primary outcome measure was visit volume for all primary pediatrics, adolescent medicine, newborn clinic, and telehealth visits. Our secondary outcome measure was the up to date vaccine status for children 13 months. The balancing measure was show rates for both in-person care and telehealth.

The number of visits scheduled and attended was extracted from the EMR. We used a Chi-square test to compare pre and post show rates. SAS Studio 3.8 (SAS, Inc. Cary, N.C.) was used for analysis. This study was determined exempt by the Columbia University Institutional Review Board.

RESULTS
Before the COVID-19 pandemic, our annual visit volumes were over 34,000 pediatric, 3,000 adolescents, and 1,900 newborn visits per year. The outcome measure of visit volume over the 7 weeks of practice consolidation changed in different ways for the general pediatric, adolescent, and NBC service lines (Table 2; Fig. 3).

For general pediatrics, the average number of visits decreased from approximately 662 per week before consolidation to 370 per week during consolidation, including in-person and telehealth visits. Well-child visits decreased from 312 to 130 visits per week and in-person urgent care from 350 to 8 visits per week to account for patient safety needs. In parallel, telehealth visits increased from 1 to 2 video visits per week to 140 video or phone visits per week. Despite the decrease in in-person visits, the outcome measure of vaccine status remained relatively high. Of the 1,860 patients 0–13 months of age who received care at our practice sites, only 31% (n = 579) did not receive their needed primary vaccine

Fig. 2. Practice consolidation process map.
series on time. The adolescent medicine team maintained their visit volume, seeing on average, 46 visits per week postconsolidation compared with 57 visits preconsolidation; however, the majority (67%) were telehealth visits. The average NBC volume increased from 37 visits per week preconsolidation to 54 visits per week, as 45% of local community pediatricians’ offices closed during the height of the pandemic. The number of NBC patients who decided to establish care within our general pediatric practice increased from approximately 70% to 90%.

As a balancing measure, there was a statistically significant increase in show rates from preconsolidation to postconsolidation for general pediatrics (72%–80%, $\chi^2 = 8.68, P = 0.003$) and adolescent medicine (54%–70%, $\chi^2 = 4.29, P = 0.038$). The show rate change was not significant for Newborn Clinic (86%–90%, $\chi^2 = 0.38, P = 0.53$) (Table 2).

During the consolidation period and due to our centralized nursing call pool and portal access, the process measure of daytime phone call volume increased substantially. The 8 weeks preconsolidation had 1,606 nursing messages, averaging 200 per week. During the 7 weeks of consolidation, there were 3,077 messages, averaged to 384 per week. The process measure of after-hours phone calls also increased, with 208 calls received over the weeks of consolidation, compared to 116 calls during the same period last year.

### DISCUSSION

Through the use of quality improvement methodology focused on data-driven cycles of change and patient safety, our team effectively and efficiently consolidated 4 pediatric primary care practices, an adolescent practice, and a newborn practice into 1 site during the height of the first wave of the COVID-19 pandemic in NYC. Many of the lessons learned during this implementation will be valuable to other pediatric practices as they grapple with a similar need to adjust patient care in the wake of the pandemic.

Our practices used resources from the Centers for Disease Control and Prevention and New York State Department of Health to guide our practice transformation and ensure both safety of medical personnel and the families we serve, while ensuring continuous patient care.5,10 The creation of multilevel screening, along with rapid rooming and collaboration with environmental services to maintain office cleanliness, reassured patients and aided in improved visit rates compared to other city sites.11 To see patients safely, our capacity for in-person visits dropped dramatically, impacting our ability to vaccinate patients. Choosing to limit in-person visits to 13 months and younger allowed us to focus resources on the primary immunization series, including measles vaccination, which was of particular importance given the recent measles outbreaks in NYC.12 As the local cases of SARS-CoV-2 decreased, we expanded our age range to include older children and adolescents. This balance of patient safety and clinical needs is likely the most formidable challenge for practices and requires attention to community needs and locally available resources.

Although in-person visit rates dropped dramatically, similar to pediatric practices around the country,11 newborn care was the exception. Given the large portion of community practice closures, the need for NBC appointments grew, and operations were scaled up to provide a secure medical home for these patients. Although considering solutions to COVID-19-related challenges, medical centers need to ensure prompt, available follow-up for discharged newborns to ensure patient safety.

The growth of telehealth, both locally and nationally, was instrumental to our success. Enhanced functionalities within the EMR included new telephone and video visit encounters with note templates to support documentation and billing, active support of patient portal enrollment, and patient portal app availability in English and Spanish. Relaxation of HIPAA regulations on telehealth by the Office of Civil Rights at the Department of Health and Human Services,13 as well as measures by our state health department and government,14,15 allowed billing and reimbursement for both video and telephone visits, and utilization of other platforms such as Doximity and Zoom. Also, ACGME accelerated the use of the Common Program Requirements to permit residents and fellows to participate in their patients’ care using telehealth during the pandemic.16 Despite potential challenges to video visits in our diverse, low-income, limited English proficient population such as low technology literacy and unfamiliarity with this modality of care,16 overall acceptance was high. It confirmed the potential future expansion of telehealth. Of note, our adolescent patients were, as anticipated, quite adept at using mobile devices for telehealth, and adherence to scheduled appointments increased using
Despite initial challenges, the current state is ripe with opportunities for practices and centers to expand their telehealth capabilities. Despite lower call volumes prepandemic, with many patients reluctant to call, we found that many parents were willing and able to manage many of the pediatric concerns at home during this time by utilizing the call services and telehealth. Interdisciplinary workflows were created to manage this volume increase, and with all of these endeavors operating in tandem, the patient call volume was well managed. With appropriate workflows and messaging, multidisciplinary team buy-in can successfully shift patients’ usual communication practices. In addition to local patient outreach efforts, we learned that media is a powerful tool to disseminate health information locally and nationally. Following media campaigns by our pediatricians, we had families call our offices requesting vaccines and inquiring about telehealth, stating they had seen reports on local and national channels. Targeted and widespread information dissemination to patients is crucial to increase knowledge, alleviate concerns, and dispel fears.

Families in communities served by our preconsolidation practices include those at greatest risk for COVID-19 morbidity and mortality and adversity due to interrupted access to a medical home, educational institutions, and social services during the pandemic. Therefore, it was paramount that we implement new screening processes for social determinants of health and connect families to available community and mental health resources. Telehealth expansion allowed our off-site team members to connect with families at home. Vigilance is needed by providers around the increased risk for depression and anxiety during this time and the risk for child abuse, which may be missed because of inaccessibility to mandated reporters such as school teachers and daycare providers. Team efforts to provide resources and support during trying times are imperative for our patients’ health and well-being, especially the most vulnerable.

Our overall practice model also served as the basis for much of our success. Our practice model is a mixed model where both faculty and residents provide well-child and urgent care for patients. This framework allows for a high level of continuity of care, high quality of care, and patient satisfaction. Despite restrictions on well-child in-person visits during the pandemic, we maintained a connection with the most vulnerable subset of our CSHCN. Using a preexisting stratification model and registry, we initiated provider-driven outreach to our most complex patients. Social workers, nurse care managers, and population health volunteers assisted PCPs with targeted correspondence. Because faculty were comfortable caring for their primary patients and experienced in all workflows, they could adapt to covering patients other than their own, although not ideal for patient-centered, well-coordinated care. Infection rates decreased in the community. We returned to all previous primary care sites and their respective provider-driven primary care panels.
As the threat of COVID-19 wanes, we could re-establish many of our previous, patient-centered workflows. However, some of the changes that were made during consolidation were continued due to their successes. We found that many urgent visits can be appropriately handled via telehealth, limiting the need for families to come to the practice in person, potentially missing work and school. We have expanded the role of telehealth, and all faculty and residents are now trained in telehealth visits. Many of the team communication workflows, including consolidated processes for scheduling and triaging, have continued.

**CONCLUSIONS**

Implementation of the pediatric practice consolidation required a multidisciplinary team approach supported by QI methodology. Input and cooperation from hospital leadership, practice leadership, nursing, information technology, and community resources enabled success. Ensuring the safety of our patients and staff in our environment was essential for all in-person care. Through these combined efforts, we were able to rapidly expand telehealth use, maintain vaccinations for our target population, increase newborn care access and improve show rates for well-care visits during unprecedented times in the epicenter of the first wave of the COVID-19 pandemic.

**DISCLOSURE**

The authors have no financial interest to declare in relation to the content of this article.

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