

20% (64% or higher) between 2013 and 2016. We continued to collect data from 2017 to the present.

METHODS

Environmental Context

Our large urban primary care teaching clinic, the Child Health Clinic (CHC), cares for approximately 13,000 patients with 33,000 visits per year. The patients are primarily from underserved racial and ethnic communities. Demographics reflect the neighboring community, with 56% of the patients identifying as Hispanic; 40% speak Spanish as their primary language.

Over 80% of the patient population receives health insurance through Medicaid.

We train 56 pediatric continuity residents who have their weekly clinic in CHC over the 3 years of training. Additionally, we have 10–12 other trainees each month during their ambulatory pediatrics rotations, including medical students, physician assistant and nurse practitioner students, family medicine residents, and pediatric residents who have their continuity elsewhere in the community.

The CHC aims to provide comprehensive services consistent with the critical concepts of the medical home. We have a fully integrated mental health team of psychologists and psychiatrists, a full-time social worker, lactation consultants, community health navigators, and nurse case coordinators. We screen for postpartum depression with the Edinburgh Postpartum Depressions Scale, developmental delays with Ages and Stages Questionnaire, and psychosocial issues with a 14-item screener that asks about parents' healthcare, food insecurity, housing/financial issues, school issues, parental isolation, mental health, and drug use. Twenty percent of patients in our high-risk population screen positive, and most of those families endorse multiple items on the psychosocial screener.

We have a pod-based clinic design. We group medical assistants, nurses, faculty, and residents in a team-colored pod, with 4 colors total (orange, blue, green, and purple), each with a workspace surrounded by eight exam rooms. We use Epic (Epic Systems, Verona, Wis.) as our Electronic Medical Record (EMR).

Leadership

Our clinic leadership team is well-established and has worked together closely for over 5 years, including an Ambulatory Nursing Director (author KG), Process Improvement Director (author MM), and Clinic Medical Director (author MB). Our team participated in a training program through our campus-based Institute for Healthcare Quality Safety and Efficiency (IHQSE).¹⁴ The IHQSE is a year-long training program for healthcare providers/leaders that seeks to build high-functioning clinical leadership teams to drive continuous improvement. The program focuses on developing leadership competencies, creating a strategic vision, using quality and

change-management tools to effect sustainable change and data-driven improvements positively, and improving team engagement. This program's focus is not merely to do a single project; instead, the intent is to develop a leadership team that can implement projects and create sustainable change focused on data-driven outcomes to improve care.

Support

During this program, we received additional time and hospital support [eg, access to marketing, mentorship from Chief Medical and Patient Safety Officer (author DH), staff assistance, and analytical help from the hospital's process improvement team].

Interventions

An analysis of a cohort of 15-month-old children ($n = 618$) seen in the clinic in the previous year (2012) revealed that only 25% had completed all of the First Five recommended WCC visits ("100% Club").¹⁵ Continuity at baseline in 2012 was 13% for seeing individual providers and 71% for being seen in the correct pod.

We conducted a series of in-person interviews with parents/caregivers of 12- to 15-month-old children to learn how our families felt about improving access to care, continuity of care with a similar provider, and their understanding of the concept of a medical home, as well as the need to attend well-child visits regularly. Parent/caregivers were approached in person until we reached 150 interviews. We entered deidentified responses into a secure UC Denver REDcap database. (See Appendix, Supplemental Digital Content 1, which shows Medical Home Parent/Caregiver Survey, <http://links.lww.com/PQ9/A331>.)

We took a comprehensive approach to educate our families on the importance of the medical home, focusing on visits within the first year of life, and we implemented a series of 10 PDSA cycles.

Our efforts included choosing and implementing incentives for the "First Five" well-child visits, providing education to parents/caregivers one-on-one verbally at the end of the visit as well as with a handout to include in the binder; for staff and faculty with "lunch and learn" meetings. The education also included information on scheduling multiple future WCC appointments in advance with the same provider, creating a culture to promote the medical home concept with flyers, listing future appointments in the After-Visit Summary, installing waiting room banners, and purchasing branded provider and staff vests.

We piloted the following bundle of interventions within 1 treatment team pod:

1. We provided gift incentives linked to the specific age at visit (eg, tummy time mirror at 4 months). We later added diapers at each visit and chose a \$50 Walmart gift card as the final reward for attending all 5 visits because families could buy groceries and more diapers there (Fig. 1).

2. We developed and implemented a tracking system within Epic EMR to make it easier for medical assistants to enter incentives provided into a flow-sheet for documentation.
3. We created a patient binder with flyers and program descriptions. The MA or nurse gave these materials and the incentives to the families after each visit.
4. We scheduled visits up to 4 months in advance to promote seeing the same provider and added these visits to the After-Visit Summary sheet provided to families (Fig. 2). We used a “quick schedule” EMR Epic feature and trained all providers and staff on using it.
5. We learned from another team in the IHQSE Program how to identify a resident provider and the pod color in the Epic header and empanel patients so that each provider has a group assigned to them. We created an algorithm to designate Primary Care Provider (PCP) based on existing designation and visit history. PCPs are faculty attendings, resident physicians, and advanced practice providers (nurse practitioners and physician assistants) in our clinic (Fig. 3). We tested the outputs from the empanelment and then imported changes of the provider assignment into the EMR. Because there are yearly changes with graduating residents, we run these panels annually to refresh lists and reassign patients to a new incoming trainee.
6. We provided education to the scheduling team in staff meetings about the importance of continuity and looking at the provider’s name listed in the header.
7. The marketing team created waiting room banners and flyers for the binders (Fig. 4). We incorporated

these graphics into sweater vests that we gifted to the entire clinic team.

We had preliminary measurements in the pilot (not shown) that were encouraging for the 1 cohort. We then expanded to the other 3 pods in our clinic because the teams were asking to be included in the initiative.

Outcome Measures

Main Outcome: First Five Well Child Visits or “100% Club” = Completed all recommended WCC during the first year of life at 2, 4, 6, 9, and 12 months

An Epic EMR system report, including all patients with an initial visit to the CHC, used billing codes to track visits that patients had attended. We reviewed medical charts to account for missed visits indicated on the report. We moved patients from the list if, during the chart review, we discovered that they had a non-CHC (CHC) PCP, moved away, transferred care elsewhere, passed away, etc. Patients were given until their 18 Month WCC to attend the five appointments.

Process Measure

Continuity = “Usual Provider of Care” (UPC). UPC is the proportion of visits in which a patient is seen by their assigned clinician, in this case, their assigned PCP for non-urgent/sick visits.¹⁶ This method of measuring whether a patient is seen by the same provider is used in other teaching clinic settings.

Balancing Measure

Our hospital system monitors access to a standard operational report bimonthly that measures “days to third next available for WCC.” The range was 9–63 days as a measure of the availability of well-child appointments. We have same-day availability for sick visits.



Fig. 1. Incentive Gifts: Back to Sleep Onesie at entry 2 weeks, 2-month Sleep Sack, 4-month Tummy Time Mirror, 6-month Sippy Cup Bowl and Spoon, 9-month Whale Bath Thermometer and Electric Outlet Covers, and 12-month Walmart \$50 gift card.

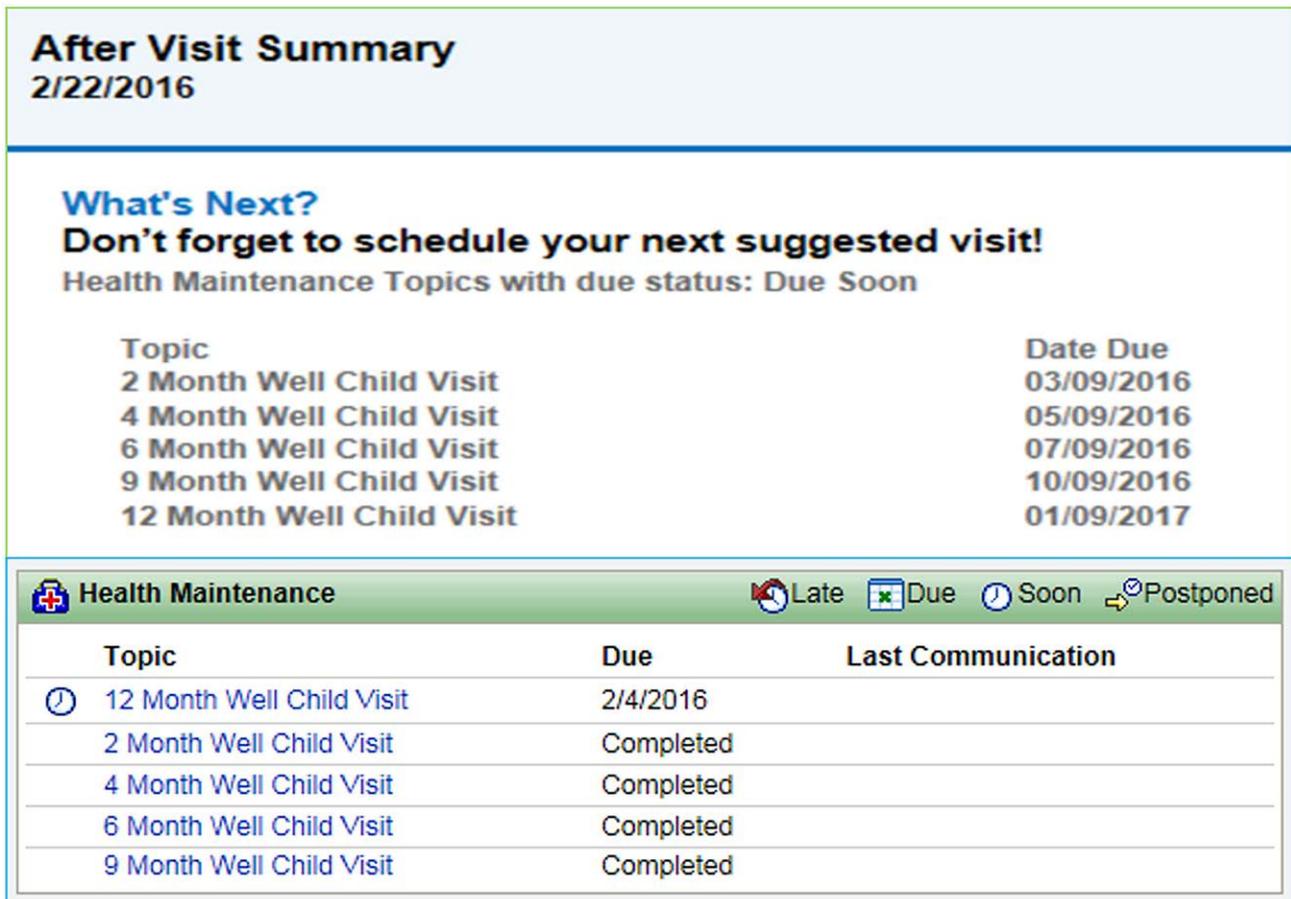


Fig. 2. After visit summary enhancements = listing all future WCC.

Cost Measure

When we started the pod pilot, the cost for gift incentives was about \$11,000 for the first year, and over the last 3 years (2017–2019), it costs about \$55,000–58,000 per year to sustain. On average, this cost works out to approximately \$62/patient. We used philanthropic funds to cover these costs.

Exemption from IRB

The project was reviewed and approved as quality improvement by CHCO's Quality Improvement Review Panel. All data were deidentified in the analysis of results.

RESULTS

Medical Home Survey

Critical information gained from the focused in-person interviews (n = 150) of parent/caregivers of 12- to 15-month-old children was that only 6% knew what a medical home was, and only 40% said that they "almost always saw the same provider for care." Many families were being seen over the first year of life but not necessarily for specified WCC visits.

Baseline Data and First PDSA Cycle

In 2013, we placed pod and PCP identification in the patient's Epic header to assist staff with scheduling. This first intervention resulted in increasing provider continuity from baseline 13% to 44% and pod continuity from 71% to 88%.

Orange Pod Pilot

In the Orange pod, we learned that only 25% (n = 71) of patients had all 5 planned WCC visits, and those who did were more likely to have seen the same provider multiple times in that first year. In total, 94% (n = 67) had visits with the same provider 2 or more times.

A substantial group of infants (38%) was lost to follow-up (eg, never returned or "moved or gone elsewhere"), which occurred mainly in the first 4 months. In those families who moved or went elsewhere, seeing the same provider during consecutive visits happened only 8% of the time.

When we learned this as part of our PDSA cycles during the pilot, we implemented an educational intervention with affiliated University of Colorado Hospital nursery staff to be sure that families were choosing our clinic for their new infant with the intent of arranging for ongoing care and not just because it was geographically close to

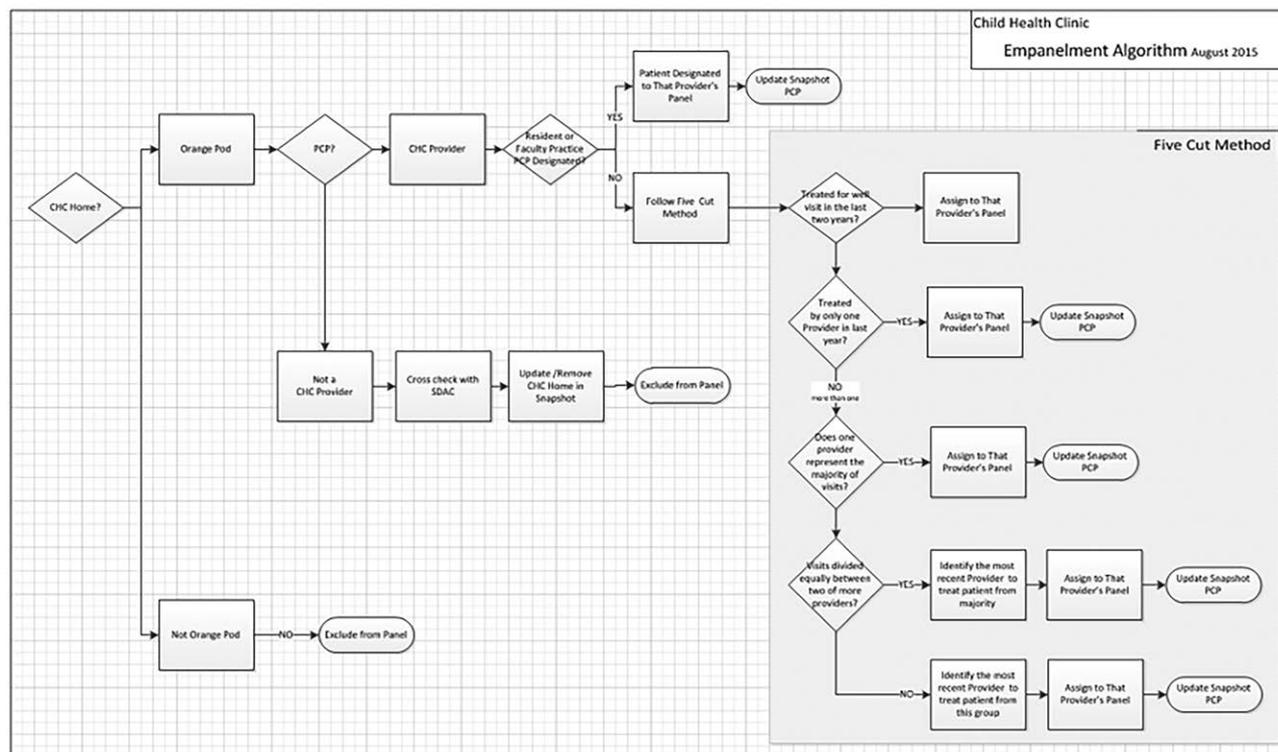


Fig. 3. Empanelment algorithm.

where they gave birth. This intervention was in place for about 6 months and was helpful to increase awareness of this issue.

Run Charts and Analyses

We achieved a steady increase in the proportion of patients seen for 100% of the First Five visits between 2013 and 2018 (770 in 2013, 804 in 2014, 922 in 2015, 981 in 2016, 933 in 2017, 770 in 2018, and 722 in 2019 with a total of 5902 over the course of the project). Additionally, we performed the 2-sample % Defective Test from 2013 to 2017 and found $P < 0.001$ for continuity and $P < 0.001$ for adherence (Figs. 5, 6).

Sustainability

We reported continued high rates in 2018. The 2019 Birth Cohort shows a decrease because the COVID pandemic in March 2020 likely affected compliance in those infants born later in 2019. Spot chart review (n = 100) showed that many had the 2-month and 4-month visits and then missed or delayed well-child care visits till later in 2020 due to the pandemic. We still had 84% with 4 or more out of the full “First Five”—that is, 60% of patients having all First Five visits and 24% missing only 1 of the 5 visits (Fig. 6).

DISCUSSION

We successfully increased attendance rates for planned WCC visits and increased continuity with providers due

to our multifaceted approach and strong, dedicated leadership team. We began this process of change by talking to families in our clinic about their concerns, and then we planned and implemented numerous PDSA cycles for 3 years. We also presented data as evidence to support our approach to the providers in the clinic. We were thrilled with the positive outcomes.

Our age-appropriate gifts and diapers and continuity plan were provided at each visit to parent/caregivers with the added goal that achieving 100% of First Five WCC at 12 months would yield an additional financial incentive for parent/caregivers. We also changed the culture and eliminated “waste” in the spirit of lean thinking by ensuring that families would always leave with a plan for future visits with the same provider¹⁷

Continuity and adherence have been studied extensively by others. Walker et al¹⁸ found in a systematic review that continuity in resident clinics averaged 50% and lower than for independently practicing physicians; so our achievement of 78% is notable. Wolf et al^{19,20} have studied attendance/adherence with well-child visits in populations similar to ours in large database systems. They found that mothers and children who were publicly insured, younger in age, had a higher number of pregnancies, transportation issues, and other life stressors had poorer attendance.^{19,20} In a 2018 study, the most frequently attended visits were 2, 4, and 6 months visits compared with WCC visits at 15 months, 18 months, and 4 years.⁶ We focused on the first year of life as the critical

Don't forget to schedule your next visit with your doctor.
No olvide programar su próxima cita médica.

2 MONTH VISIT
 CONSULTA A LOS 2 MESES
 Measurements (Peso y estatura), Crying & Fussiness (Llanto e irritabilidad), Immunizations (Vacunas)

4 MONTH VISIT
 CONSULTA A LOS 4 MESES
 Measurements (Peso y estatura), Teaching & Oral Health (Dentición y la salud oral), Immunizations (Vacunas)

6 MONTH VISIT
 CONSULTA A LOS 6 MESES
 Safety Proofing (Seguridad en el hogar para niños), Eating & Drinking (Comer y beber), Immunizations (Vacunas)

9 MONTH VISIT
 CONSULTA A LOS 9 MESES
 Measurements (Peso y estatura), Reading (Lectura), Car Seat Voucher Program (Programa de vale para asiento de seguridad)

12 MONTH VISIT
 CONSULTA A LOS 12 MESES
 Water Safety (Seguridad en el agua), Tantrums (Berrinches), Immunizations (Vacunas)

& BEYOND
 Y MÁS ALLÁ

YEARLY WELL VISITS
 CONSULTAS ANUALES PARA EL BIENESTAR
 Preschoolers (Preescolares), Grade-Schoolers (Niños de edad escolar), Toddlers (Niños pequeños)

Don't miss the milestones. Make sure to attend every visit, and earn gifts as you go!
Asegúrese de asistir a cada consulta y ¡gana regalos conforme avanza!

Fig. 4. First five banner.

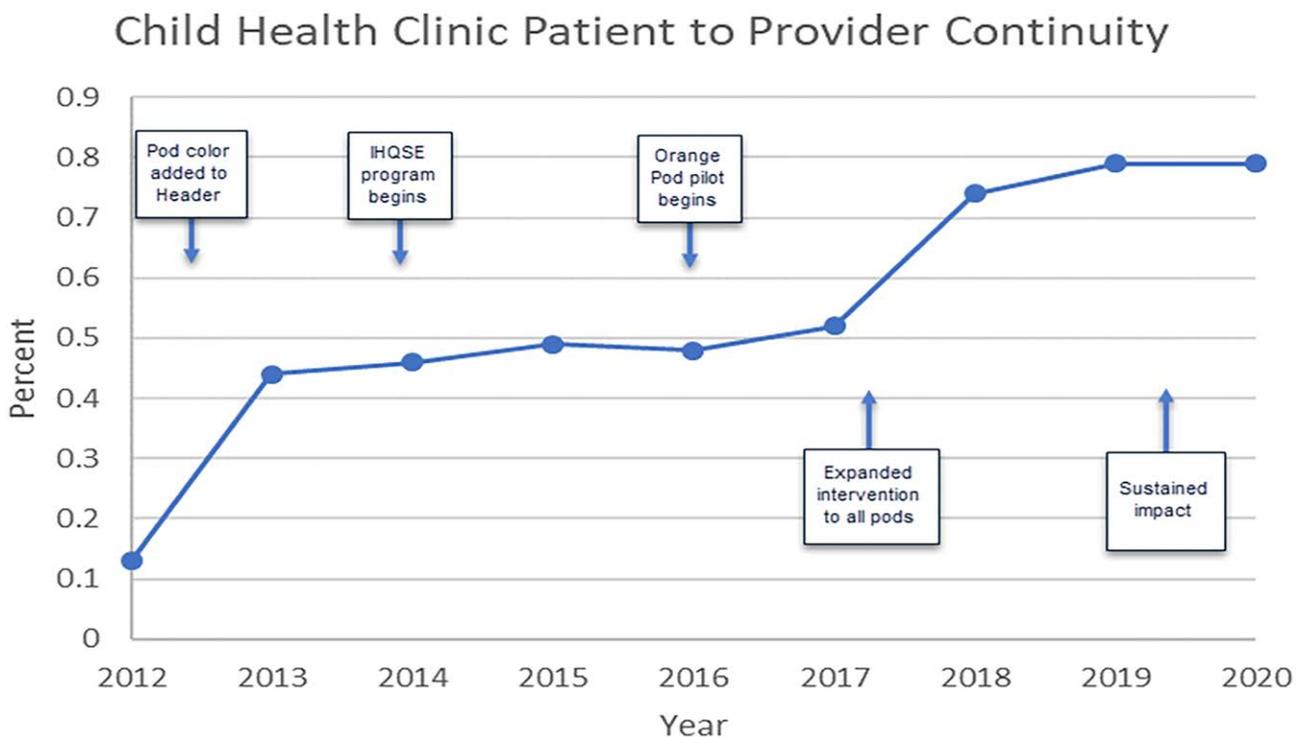


Fig. 5. First five continuity over time.

First Five Adherence by Birth Year Cohort

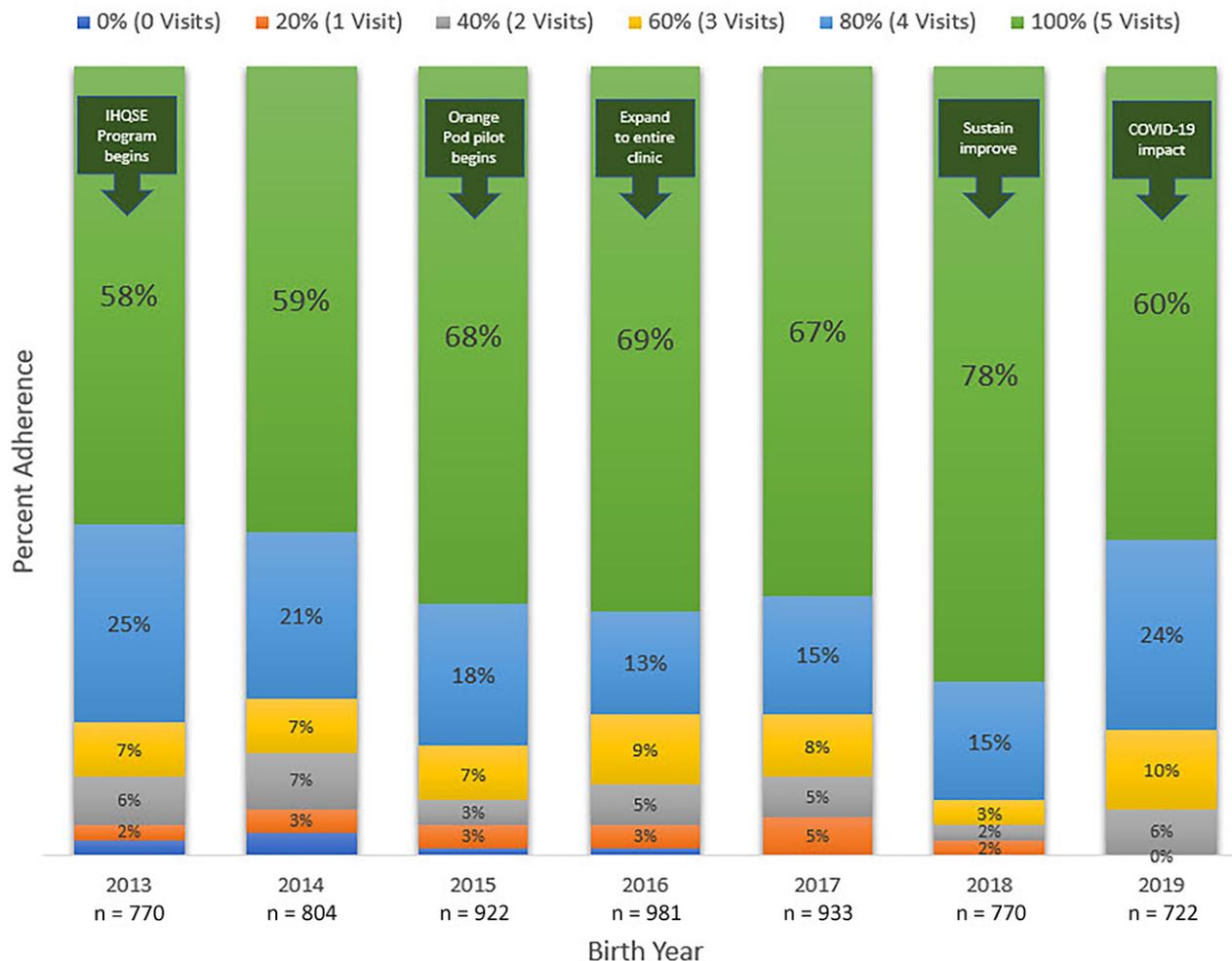


Fig. 6. First five compliance by birth year cohort (2017–2020). Note: the percent defective of 2014 is greater than 2019 at the 0.05% confidence interval. *P* < 0.001.

time to establish the continuity relationship with a provider and ties to a medical home.

Incentive programs published in several observational studies improved the adherence and the quality of prenatal care because of more screening.^{21,22} Monetary incentives such as a \$30 credit for a well-child visit for Child Health Insurance Program (CHIP) families, which is a low-cost insurance program for families that earn too much to be eligible for Medicaid, or a \$10 Target gift card (Target Brands, Inc., Minneapolis) per visit have also been effective.^{23,24} Yet these have only been studied in older children older than 3 years of age and not in children in the critical first year of life when they receive immunizations and critical screening.²⁴ Also, Needleman et al described increased adherence with the addition of the Reach Out and Read program that provides books as incentives.²⁵

The data presented here included some of the cohorts from 2019 into 2020 when the COVID-19 pandemic started. We never stopped seeing patients in our clinic and focused on <3-year-old children for WCC. We scheduled

WCC before 3:30 PM and sick children from 3:30–6:30 PM. Our providers called those who had canceled appointments to encourage them to reschedule and reassure them that we were taking safety precautions.

Our strong leadership team and the support of coaches and data analysts provided by the IHQSE certificate program were critical to our project’s success. This environment was ideal for the Medical Director (author MB) and Nursing Director (author KG) because often, in these roles, the day-to-day problem-solving does not provide time for creative solutions. The use of the EMR for scheduling by staff/providers was easy and anecdotally rewarding for providers to see the same patients/families again.

LIMITATIONS

This improvement work occurred in 1 academic primary care practice and should be assessed in other settings to determine its generalizability. The primary limitation may be the financial cost of the incentives, but the cost was

reasonable and easily accomplished in our setting with small grants. Other clinics caring for underserved populations may not have the philanthropic resources of a hospital and might need to find other partners for this purpose. The Epic EMR does not have a field that captures patient status, such as "moved" or "receiving care elsewhere"; so the manual review of records to eliminate these patients from the analysis was time-consuming.

CONCLUSIONS

This QI initiative had a sustainable and robust effect maintained for more than 2 years since initial improvements with good results even in the pandemic. We changed the incentive at 9 months to a booster feeding seat because the specific water thermometers distributed at this visit were discontinued from the manufacturer.

NEXT STEPS

In terms of potential spread, we are considering incentivizing other WCC visits (eg, 15- to 18-month-old, 3-year-old, and 6- to 9-year-old children), where we currently see lower adherence rates in our population. Our state Medicaid program is interested in financially supporting this incentivized approach.

DISCLOSURE

In-kind salary (as part of IHQSE) has been given for all authors from Children's Hospital Colorado and Department of Pediatrics, University of Colorado School of Medicine. All the other authors have no financial interest to declare in relation to the content of this article. This study was supported by Colorado Rockies' Foundation, McCormick Foundation, and First 1000 days Children's Hospital Foundation.

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