Promoting Pediatric Preventive Visits Through Quality Improvement Initiatives in the Primary Care Setting

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Objective To evaluate whether quality improvement (QI) capacity-building in affiliated primary care practices could increase well care visit uptake.

Study design Partners For Kids (PFK) is an accountable care organization caring for pediatric Medicaid beneficiaries in Ohio. PFK QI specialists recruited practices to develop QI projects around increasing well care visit rates (proportion of eligible children with well care visits during calendar year) for children aged 3-6 years and adolescents. The QI specialists supported practice teams in implementing interventions and collecting data through monthly or bimonthly practice visits.

Results Ten practices, serving more than 26 000 children, participated in QI projects for a median of 8.5 months (IQR 5.3-17.6). Well care visit rates in the QI-engaged practices significantly improved from 2016 to 2018 ($P < .001$ for both age groups). Over time, well care visit rates for 3- to 6-year-old children increased by 11.8% (95% CI 5.4%-18.2%) in QI-engaged practices, compared with 4.1% (95% CI 0.1%-7.4%) in non-engaged practices ($P = .233$). For adolescents, well care visit rates increased 14.3% (95% CI −2.6% to 31.2%) compared with 5.4% (95% CI 1.8%-9.0%) in QI-engaged vs non-engaged practices over the same period ($P = .215$). Although not statistically significant, QI-engaged practices had greater magnitudes of rate increases for both age groups.

Conclusions Through practice facilitation, PFK helped a diverse group of community practices substantially improve preventive visit uptake over time. QI programs in primary care can reach patients early to promote preventive services that potentially avoid costly downstream care. *(J Pediatr 2021;228:220-7)*.

Well care visits are an integral component of pediatric primary care during which children receive high-impact, low-cost services that prevent disease development and promote healthy lifestyles.[1,2] Examples of these services include immunizations, diet and weight counseling, and developmental screenings. The American Academy of Pediatrics consistently has recommended that children receive annual well care visits starting at age 3 years, and many elementary schools require documentation of well care visits for enrollment.[1]

Despite the recognized value of preventive care in promoting pediatric health, well care visits have gone underused, with particularly low rates seen among publicly insured children and older age groups. A 2012 Medicaid policy brief looking at well care use among fee-for-service Medicaid enrollees across 9 states found that 63% and 38%, respectively, of children aged 3-6 years and 11-17 years had received well care visits in 2008.[3] Even with the increased access to preventive services provided by the Patient Protection and Affordable Care Act (ACA), fewer than one-half of adolescents receive recommended preventive services. A recent study by Adams et al[4] showed that well care visit rates for adolescents increased from 41% in the pre-ACA period (2007-2009) to 48% post-ACA (2012-2014). Multiple factors contribute to observed low rates of well care visits, ranging from a lack of awareness that well visits are distinct from sick visits to logistical challenges and competing priorities for low-income families trying to manage work/school schedules, transportation barriers, or other childcare needs.[3,5-9]

Partners For Kids (PFK; Columbus, Ohio), a pediatric accountable care organization (ACO) serving children enrolled in Medicaid managed care organizations throughout central and southeast Ohio, has observed consistently lower rates of well care visit uptake among its patients compared with the average performance for Medicaid enrollees nationally.[10] Given the ACO's previous experience building quality improvement (QI) capacity in community practices,[11] PFK sought to use

ACA	Patient Protection and Affordable Care Act	PDSA	Plan–do–study–act
ACO	Accountable care organization	PFK	Partners For Kids
AWC	Adolescent well care rate	QI	Quality improvement
CAP	Children and adolescents' access to primary care practitioners	QIS	Quality improvement specialists
EMR	Electronic medical record	SPC	Statistical process control
KDD	Key driver diagram	W34	Well care visit rate for 3- to 6-year-olds

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QI methodology to help its affiliated providers increase well care visit uptake. The objective of this study was to evaluate the impact of QI practice facilitation on increasing access to preventive services, as measured by well care visit rates, in community-based primary care practices. Further, practice-level characteristics associated with improved well care visit rates and/or likelihood for QI success were evaluated.

Methods

PFK is an ACO composed primarily of community-based physician offices that have partnered with Nationwide Children's Hospital (Columbus, Ohio) to oversee healthcare delivery for pediatric Medicaid recipients in Ohio. PFK has medical and financial responsibility for approximately 330 000 pediatric Medicaid recipients in 34 counties across central and southeast Ohio. PFK has direct contracts with more than 2100 providers in independent and Nationwide Children's Hospital-employed practices,[12] and its governance is shared equally between the hospital and representatives of affiliated physician groups.

As a resource to affiliated community practices, PFK has a QI Coaching program, composed of 5 quality improvement specialists (QIS) who use practice facilitation to support the implementation of customized QI initiatives within individual practices. Since its inception in 2014, the PFK QI program has worked with more than 50 community practices to build QI capacity and pursue projects on immunizations, asthma management, and oral health, in addition to preventive care uptake.[13]

Community primary care practices, providing care to ≥100 pediatric Medicaid recipients and actively engaged with PFK as of 2016 (n = 157), were considered eligible for participation in the Healthy Children Initiative, a QI effort launched in 2017 to improve uptake of preventive care for PFK patients. As of July 2018, 10 interested practices had partnered with a PFK QIS on a QI project to increase well care visit rates. Each practice established an internal QI team, composed of healthcare providers and office staff supporting the work. QIS conducted interactive, onsite training, teaching the internal QI team about principles in the Institute for Healthcare Improvement Model for Improvement.[14] The practices also signed business associates' agreements with PFK to facilitate data collection through the practice's medical records to monitor project progress. These 10 practices formed a cohort that was followed prospectively to evaluate progress in improving well care visit rates in 2017 and 2018 compared with its baseline in 2016.

This work was deemed QI by the Nationwide Children's Hospital's institutional review board and was exempt from further review.

Interventions

The participating practices identified specific, measurable, achievable, relevant and time-bound (ie, SMART) aims for each individual project (**Figure 1**; available at www.jpeds.com).[14] The PFK QI team facilitated internal team discussions and used relevant QI tools such as process maps, Fishbone diagrams, and Pareto charts to help each practice develop its own key driver diagram (KDD). Change concepts and/or interventions were tested and modified through plan–do–study–act (PDSA) cycles. Multiple PDSA cycles were performed targeting different key drivers within each practice. Over the study period, data were collected by retrospective reviews of each practice's medical records and of administrative medical claims data available to PFK. Each practice's performance on its outcome measure(s) for the most recent 8 months before project initiation was used to determine individual baselines. After project initiation, data were collected monthly and shared with the project team to chart progress, evaluate interventions, and adapt the project as needed to meet its aims.

Each practice developed a KDD that showcased their global and specific aims along with the key drivers and interventions identified by the practice to improve well care visit rates (**Figure 1** shows a sample KDD).

Main Study Outcomes

The primary outcomes of interest were the total proportion of eligible children who had received a well care visit within the calendar year, stratified by patient attribution to QI-engaged vs non-engaged practices. Specifically, receipt of a well care visit was reviewed in 2 age groups, aged 3-6 years (W34) and aged 12-18 years (adolescent well care rate [AWC]), as these outcomes align with the W34 and AWC measures, respectively, included in the Healthcare Effectiveness Data and Information Set, a quality performance tool used nationally by payers. Children were considered eligible for inclusion in W34 or AWC if they fell within the appropriate age range during the calendar year. Administrative claims were used to identify visits with appropriate diagnostic codes qualifying them as well care visits (**Table I**; available at www.jpeds.com). Patients were attributed to a primary care practice based on self-selection of a provider in that practice; if no selection was made, then the managed care organizations assigned each child to a primary care practice based on the volume and frequency of a patient's healthcare use over time or geographic proximity to a practice. The primary outcome measures were calculated at the end of each calendar year, although well care visit rates for rolling 12-month time periods also were calculated for use in control charts.

Data Collection

Primary care practices affiliated with PFK can vary widely by practice scope and model, so descriptive characteristics of the practices engaged in the Healthy Children Initiative were collected including practice setting, size, and patient volume. Characteristics of non-engaged community practices that had ≥100 attributed PFK patients also were collected using practice Web sites and/or interviews of practice managers. With the use of administrative claims data, the numbers of well care visits performed monthly at each community practice were collected over the study period and stratified by engagement in the Healthy Children Initiative. Demographic data available for

PFK patients included age, sex, and county of residence but not race/ethnicity. The incompleteness of PFK's data on race/ethnicity reflects a larger national need to obtain such population data for Medicaid managed care plan members.[15] As a marker of overall access to primary care, the Healthcare Effectiveness Data and Information Set measure of children and adolescents' access to primary care practitioners (CAP) was determined to capture the proportion of children attending ≥1 office-based medical visit during the specified measurement period.[16] CAP rates were calculated separately for different age groups and by QI engagement at the practice level.

Statistical Analyses

To track progress in primary outcome measures and evaluate the impact of interventions over time, separate statistical process control (SPC) charts were created and updated monthly for each practice over the study period.[17] To evaluate whether observed changes in well care visit rates were sustained over time, preliminary data for 2019 were used to update SPC charts but final year-end 2019 well care visit rates were not available due to time lag associated with claims processing. Special cause variation was identified by applying Shewhart control chart rules.[17,18]

To evaluate the collective impact of the QI initiatives on well care visit uptake within the PFK network, monthly and cumulative numbers of total well care visits were calculated for children aged 3-6 years and 12-18 years who were seen in the QI-engaged and non-QI engaged practices for each year between 2016 and 2018. Aggregate annual W34 and AWC rates and 95% CIs were determined separately for engaged and non-engaged practices over the study period. The mean percent change in W34 and AWC rates from December 2016 compared with December 2018 was evaluated for QI-engaged and non-engaged practices. Practice characteristics associated with percent improvement in practice-specific well care visit rates were explored using multivariable linear regression models. Potential factors were included in the model if they were considered a priori to be important and/or had a significant association with change in well care visit rates in univariable analyses. Analyses were performed using Stata 15.0 (StataCorp, LP; College Station, Texas), with P-values <.05 considered statistically significant. Finally, unstructured interviews with the QIS and participating practice teams provided qualitative information on factors associated with successful project implementation and the potential effectiveness of key interventions.

Results

Ten community-based primary care practices, serving more than 26 000 pediatric Medicaid beneficiaries, implemented QI projects aimed at improving well care visit rates. The median duration of QI engagement over the study period was 8.5 months (IQR 5.3-17.6). Participating practices ranged in size and were geographically distributed throughout central and southeast Ohio, with 4 practices located in rural counties. Practice ownership varied, with 6 physician-owned groups, 3 hospital-owned, and 1 federally qualified health center engaged in QI activities.

Table II presents limited descriptive characteristics of QI-engaged and non-engaged practices as well as the patient populations served by both groups. The QI-engaged practices had greater baseline well care visit rates for both aged 3-6 years and adolescents compared with the non-engaged practices. However, the proportion of patients aged 2-6 years accessing primary care for sick and/or well visits were comparable between the 2 groups (89.8% vs 89.2%; P = .110), whereas non-engaged practices had a greater proportion of adolescents accessing primary care compared with the QI-engaged practices (83.8% vs 81.5%; P < .001).

Key Interventions

Interventions implemented as part of the Healthy Children QI projects focused on 4 key drivers identified as the most important levers for raising well care visit rates: (1) Practice operations/process; (2) Clinical information systems/technology; (3) Education; and (4) Social determinants of health (Figure 1). Further detailed information on the types of interventions pursued among participating practices is available in online materials (Table III; available at www.jpeds.com).

Practice operations-focused strategies included activities that identified new opportunities for patient outreach and optimized clinic-specific scheduling processes for well care visits. Recognizing that sick visits may represent a window of opportunity for the provision of well care, some practices explored the feasibility of converting sick visits into combination sick and well visits. Depending on the practice's workflow and provider capacity, PDSA cycles were employed to combine sick and well visits either at the time of scheduling or the day of the sick visit or to focus on adding well care services to specific types of visits (eg, follow-up visits for medication adherence and refills). Other interventions that fed into this driver included use of PFK-employed patient outreach coordinators who contacted patients overdue for well care visits on behalf of the individual practices, and the use of technology, such as patient portals or text messaging, to support well care visit scheduling and appointment reminders.[19-21]

Clinical information systems/technology-based interventions were most applicable to practices with customizable electronic medical records (EMRs). These included the creation of an electronic flag to readily identify children overdue for well care visits or the use of patient portals or other communication tools to distribute patient education and appointment reminders.

Education-based initiatives sought to promote greater awareness of the importance of well care visits among patients/caregivers, office staff, and providers. PFK developed and distributed patient educational handouts, brochures, and posters for use in participating practices. In addition, there were specific interventions aimed at educating all members of the practice about well care visits, including registration staff, medical assistants, and nurses, and encouraging them to disseminate this information to patients at multiple touchpoints during the clinic visit.

Table II. Descriptive characteristics of the primary care practices and attributed pediatric Medicaid beneficiaries stratified by engagement in QI

Practice characteristics	QI-engaged practices (n = 10)	Non-engaged practices (n = 147)	*P* value
Rural, n (%)	4 (40%)	47 (32%)	.600
Practice ownership			
Physician-owned	6 (60%)	77 (52%)	.879
Hospital-owned	3 (30%)	49 (33%)	
Federally qualified health center/other	1 (10%)	21 (14%)	
Group size			.980
Small (1-2 providers)	3 (30%)	40 (27%)	
Medium (3-9 providers)	4 (40%)	60 (41%)	
Large (≥10 providers)	3 (30%)	47 (32%)	
Patient characteristics	**Medicaid patients seen at QI-engaged practices (n = 26 845)***	**Medicaid patients seen at non-engaged practices (n = 132 071)***	
Age, y, n (%)			
≤2	2763 (10.3%)	11 806 (8.9%)	<.001
3-6	7112 (26.5%)	31 382 (23.8%)	
7-11	8211 (30.6%)	38 875 (29.4%)	
≥12	8759 (32.6%)	50 008 (37.9%)	
Male sex, n (%)	13 824 (51.5%)	67 626 (51.2%)	.384
2016 well care visit rates†			
Aged 3-6 y	4623 (64.4%)	21 550 (60.6%)	<.001
Aged 12-18 y	3648 (45.4%)	21 888 (41.5%)	<.001
2016 CAP rates†			
Aged 2-6 y	7869 (89.8%)	39 558 (89.2%)	.110
Aged 12-19 y	6391 (81.5%)	44 150 (83.8%)	<.001

*The 2 groups of pediatric Medicaid beneficiaries were determined based on patient attribution to QI-engaged vs non-engaged practices.
†Denominators for the 2016 rates are based on patient attribution as assigned at the end of 2016, whereas the other patient-specific data are based on patient attribution as of the current year.

Interventions around social determinants of health focused largely on the implementation of a screening tool to identify medically and/or socially-complex patients who might benefit from working with PFK's Care Coordination program or referral to other community resources.[22,23]

Progress in Aggregate and Practice-Specific Well Care Visit Rates

From 2016 to 2018, the aggregate well care visit rate for 3- to 6-year-old children in the QI-engaged practices rose from 64.4% to 68.5%, and the well care visit rate for this age group increased from 60.6% to 63.3% among non-engaged practices (Table IV; $P < .001$ over time for both age groups). For the QI-engaged practices, the aggregate adolescent well care visit rate increased from 45.4% to 50.0%, compared with the non-engaged practices where the adolescent well care visits rate rose from 41.5% to 42.9% (Table IV; $P < .001$ over time for both age groups).

Table IV also illustrates the change in CAP rates over the same time period. QI-engaged practices observed a greater CAP rate for children aged 2-6 years in 2018 compared with non-engaged groups (92.5% vs 90.8%, $P < .001$). In contrast, CAP rates between QI-engaged and non-engaged practices were comparable in 2018 for adolescents (86.1% vs 85.5%; $P = .121$).

Figure 2 shows SPC charts that highlight how aggregate well care visit rates for both age groups changed over time among the QI-engaged practices. For children aged 3-6 years, there was special cause variation resulting in a centerline shift down in the aggregate well care visits rate in the first half of 2017 before rebounding in August 2017 to the 2016 baseline level. In addition, there was a significant upward trend in the aggregate well care visit rate observed in the last 6 months of 2018 resulting in a centerline shift in January 2019 that was sustained through the calendar year. However, among adolescents, the mean well care visit rate rose steadily, with 3 statistically significant shifts upward in the centerline mean over the study period. The last centerline shift occurred in September 2018 and was sustained through the end of 2019 (Figure 2).

For well care visit rates among children aged 3-6 years, QI-engaged practices individually observed a mean increase of 11.8% (95% CI 5.4%-18.2%) compared with 4.1% (95% CI 0.1%-7.4%) in non-engaged practices from 2016 to 2018 ($P = .233$). Among adolescents, there was a mean increase in AWC rates of 14.3% (95% CI −2.6% to 31.2%) compared with 5.4% (95% CI 1.8%-9.0%) among non-engaged practices over the same time period ($P = .215$).

Factors Associated with Greater Improvement in Well Care Visit Rates

Table V shows the results of multivariable regression analyses for factors associated with greater percent increases in W34 and AWC rates. Participation in QI was associated with a 9.4% (95% CI −0.8% to 19.5%) increase in well care visit rates for children aged 3-6 years from 2016 to 2018 compared with non-engaged practices, although this was not statistically significant ($P = .07$). Compared with small practices, those with 10 or more providers had a statistically significantly greater percent increase in well care visit rates ($\beta = 8.6\%$, 95% CI 0.9%-16.4%). Practice ownership also was associated with greater percent change in well care visit rates for young children, with physician-owned groups performing better than hospital-owned or other groups (Table V).

Looking at percent increases in AWC rates, we found that QI engagement was associated with a nonstatistically significant increase of 10.4% (95% CI −3.6% to 24.4%; $P = .144$) from 2016 to 2018. Although not statistically significant, both practice size and ownership had similar associations with percent increases in AWC rates as with W34 rates (Table V).

Discussion

By supporting QI initiatives in the community primary care office, PFK observed greater increases in well care use for both young children and adolescents among practices engaged in QI, compared with non-engaged practices over

Table IV. Comparison of aggregate, year-end well care visit rates and access to primary care (CAP) rates for children seen in the primary care practices engaged in the Healthy Children QI Initiative to children vs non-engaged practices. Also shown are rates of access to primary care for children aged 2-6 years and 12-19 years, stratified by practices' engagement in QI

Patient populations	2016		2017		2018		Mean % increase in practice-specific well care visit rates from 2016 to 2018 (95% CI)
	Well care visits	CAP	Well care visits	CAP	Well care visits	CAP	
Children Ages 3 to 6 years							
QI-engaged PFK practices*	64.4%	89.8%	64.2%	90.9%	68.5%	92.5%	11.8% (5.4%-18.2%)
Non-engaged PFK practices*	60.6%	89.2%	61.2%	90.1%	63.3%	90.8%	4.1% (0.1%-7.4%)
Children ages 12-18 years							
QI-engaged PFK practices†	45.4%	81.5%	45.7%	83.4%	50.0%	86.1%	14.3% (−2.6% to 31.2%)
Non-engaged PFK practices†	41.5%	83.8%	41.1%	84.3%	42.9%	85.5%	5.4% (1.8%-9.0%)

*Practices are stratified based on their participation in the Healthy Children QI Initiative to improve well care visit rates. Well care visit rates represent proportion of children aged 3-6 years who received a well child check during the calendar year, whereas CAP measures represent proportion of children aged 2-6 years who attended ≥1 office-based medical visit during that year.
†Practices are stratified based on their participation in the Healthy Children QI Initiative to improve well care visit rates. Well care visit rates represent proportion of children aged 12-18 years who received a well child check during the calendar year, whereas CAP measures represent proportion of children aged 12-19 years who attended ≥1 office-based medical visit during the past 2 years.

the study period. Although participation in QI was not associated with specific practice-level characteristics, physician-owned practices and large provider groups were found to have greater percent increases in well care visit rates over time. Taken together, these data indicate that quality improvement methodology can be both feasible and effective in diverse community-based primary care practices to promote uptake of preventive care in children.

Participation in QI appears to have an impact on increasing uptake of preventive care in the pediatric primary

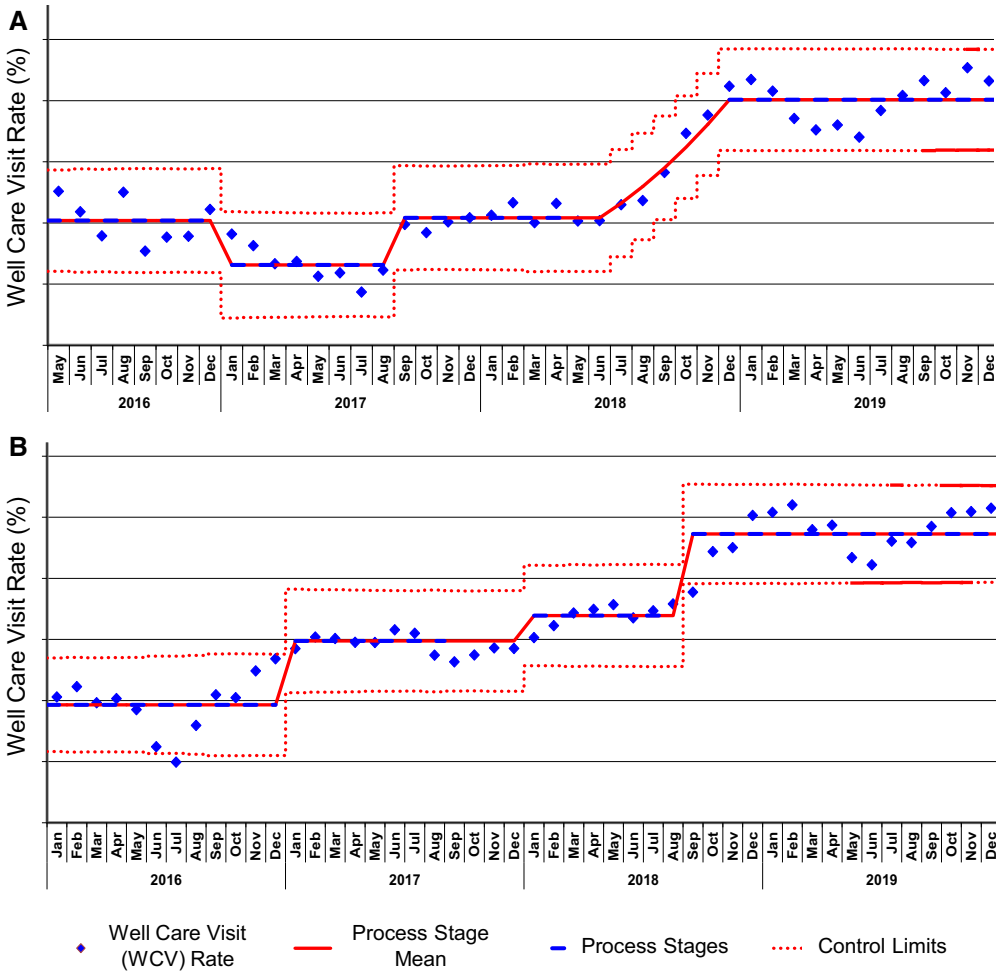

Figure 2. Control charts for aggregate well care visit rates among **A**, 3- to 6-year-old children and **B**, adolescents in practices engaged in QI projects.

Table V. Factors associated with likelihood for well care visit compliance

Practice characteristics	Adjusted β-coefficient for % increase in W34 rates* from 2016 to 2018 (95% CI)	Adjusted β-coefficient for % increase in AWC rate* from 2016 to 2018 (95% CI)
QI participation		
Non-engaged	Reference	Reference
Engaged	9.4% change (−0.8% to 19.5%)	10.4% change (−3.6% to 24.4%)
Practice setting		
Urban	Reference	Reference
Rural	−2.9% change (−8.3% to 2.6%)	0.1% change (−7.5% to 7.6%)
Practice size		
Small (1-2 providers)	Reference	Reference
Medium (3-9 providers)	5.6% (−0.7% to 11.8%)	3.5% change (−5.3% to 12.2%)
Large (≥10 providers)	**8.6% (0.9% to 16.4%)**	1.1% change (−9.5% to 11.6%)
Type of practice model		
Physician-owned	Reference	Reference
Hospital-owned	**−10.7% change (−17.4% to −4.0%)**	−2.4% change (−11.7% to 7.0%)
FQHC/other	**−15.5% change (−24.1% to −6.8%)**	−6.9% change (−18.8% to 5.1%)

FQHC, federally qualified health center.
Bold type indicates statistical significance with *P*-value <.05.
*Practice-specific changes in W34 and AWC rates from December 2016 to December 2018 were evaluated in multivariable regression models.

care setting. For both age groups, QI-engaged practices had roughly 10% greater increases in well care visit rates over time compared with non-engaged practices. Given PFK's historical experience with declining and/or stable well care visit rates in its Medicaid population, the substantial improvement in well care visit rates seen among QI-engaged practices over time is promising. QI engagement may not have produced a statistically significant difference in these analyses due to the relatively small number of QI-engaged practices compared with non-engaged practices and because practices at varying stages of their QI journey were included in the engaged group such that sufficient time had not lapsed to observe an effect of their work. This is supported by the clear upward trend in well care visit rates seen for both age groups starting in the second half of 2018 compared with the first half of the year.

The differing trends in well care visits and CAP rates between engaged and non-engaged practices is further evidence of the likely benefit of QI engagement. Although 2016 CAP rates for young children were similar between the 2 groups, QI-engaged practices went on to have a significantly greater rate in 2018, likely driven by a greater uptake of well care visits. Among adolescents, QI-engaged practices had a lower CAP rate in 2016 that subsequently rose to be comparable with the non-engaged practices by 2018 due again to increased well care visits. Among QI-engaged practices, increasing well care visits had the added benefit of engaging new patients not previously receiving outpatient care and thereby increasing access to all primary care services. Thus, this rise in CAP, as a measure of overall access to primary care, is very favorable from the perspective of a Medicaid ACO, given how publicly insured populations experience systematically reduced access to care due to reluctance of providers to accept lower Medicaid payments and lower network adequacy in economically distressed communities.[24,25]

Although not predictive of QI engagement, practice size and ownership model did emerge as important factors associated with improvements in well care visit rates over time. Compared with their respective reference groups, practices with 3 or more providers and physician-owned groups independently showed greater improvement in well care visit rates over time. It remains to be seen if these practice characteristics were more favorable for promoting preventive care uptake specifically or can be generalized to predict a likelihood for QI success more broadly, or perhaps both. It is plausible that multi-provider practices may have greater capacity and resources to accommodate more well care visits over time compared with smaller practices operating at near or maximum capacity already. In addition, physician-owned groups may have greater operational flexibility to design and implement interventions compared with practices operating within a larger health system bureaucracy that needs to approve such changes. Further, these practices may be more likely to assemble an effective, multidisciplinary team supported by a project champion, which are important factors previously shown to be strongly associated with participation and success in QI projects.[11,26-31] Given that most medical practices have implemented EMRs, it also may be more feasible for independently-owned groups to readily implement EMR-based changes, such as electronic flags to identify children overdue for well care visits.

Despite shared goals, the types of interventions selected and their relative successes varied across practices due to differing strategic priorities and available resources. Small- to mid-sized physician groups had an increased likelihood for successful implementation of and recognized benefit from QI project interventions. For example, although each practice developed a process for identifying and contacting children overdue or nearly overdue for well care visits, small- to mid-sized physician groups were more adept at modifying their EMRs to automate patient identification and maintain QI interventions as the project progressed. These groups also often had additional staff capacity for report generation and maintenance over time. Another critical indicator of success was the identification of a clear project champion who could

work effectively with all members of the team. Project champions represented a variety of job roles within a practice (ie, provider, office manager); the person's ability to communicate change concepts and achieve consensus was far more important than their job role. Here again, smaller-sized practices appeared more often to successfully identify a project champion. Among the 3 large practices in our cohort, 2 adopted an approach of developing smaller working teams based at different clinic sites, which allowed them to progress at a more rapid pace. Finally, it appeared that some physician-owned groups had long-established, working relationships among staff members and thus had strong interteam dynamics, allowing them to more readily adapt to the team-based nature of QI work.

There are some important limitations of this study. Due to the lack of a clinically integrated network across the ACO, these data are based largely on administrative claims, which have a significant time lag of up to 6 months for claims processing and the potential for misattribution of patients to practices. To address this, the PFK QI team does conduct medical chart reviews when feasible to validate data reports. Second, PFK has limited interactions with the non-engaged practices included in this study and thus may have been unaware of QI work or other interventions implemented in these practices to improve preventive care. However, this would have led to an underestimate of the potential positive impact of QI on well care visit rates. Other unmeasured practice characteristics, such as resource availability, staff motivation, and previous QI experience, could have contributed to observed differences. In addition, well care visit rates represent quality metrics often tied to provider compensation by healthcare systems or payment incentives by insurance plans. The potential impact of these incentives on practice performance was unable to be explored due to limited data for practices that were not QI-engaged. Finally, although PFK is a large and diverse pediatric ACO with respect to geography and the characteristics of affiliated practices, study findings may not be generalizable to other community practices and/or organizations in other states.

Given the additional investment of time and resources required by QI, practice facilitation and operational support from external organizations can enable primary care practices to start building their own QI capacity. Although a diverse group of practices—independent of size, location, or practice model—were able to successfully implement and show progress toward raising well care visit rates, it is clear that customized approaches are needed for each practice. Further efforts to pair operational strategies with practice characteristics may help ensure greater success for primary care practices embarking on new QI initiatives. ■

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50 Years Ago in *The Journal of Pediatrics*

An Update on the Phenotypic Map of 18q Deletions

Wertelecki W, Gerald PS. Clinical and chromosomal studies if the 18q-syndrome. J Pediatr 1971;78:44-52.

In 1971, Wertelecki and Gerald offered a detailed description of the original 4 patients with 18q- syndrome and 2 additional patients. Salient features include short stature, microcephaly, midface hypoplasia, prominent antihelix and antitragus with stenotic/atretic ear canals, tilting of optic discs, "carp-shaped mouth," ocular hypertelorism, congenital vertical talus deformity, and severe cognitive impairment. With a prevalence of 1:40 000, the 18q-syndrome (also known as de Grouchy syndrome) has subsequently been divided into proximal (18q11.2-18q21.2) and distal (18q21.1-qter) 18q deletions.

By using tiling chromosome microarray, which enabled a greater than 2-fold coverage within chromosome 18, applied to 29 patients with 18q deletions, more refined mapping of critical regions for microcephaly (18q21.33), short stature (18q12.1-q12.3, 18q21.1-q21.33, and 18q22.3-q23), white matter disorders and delayed myelination (18q22.3-q23), growth hormone insufficiency (18q22.3-q23), and congenital aural atresia (18q22.3) were able to be made.[1] Patients with deletions distal to 18q21.31 had milder cognitive impairment as compared with patients with deletions proximal to 18q21.31. The critical region for the classic 18q-syndrome is within the 4.3 MB 18q22.3-q23 region. Subsequent reporting of 2 new patients and a review of 27 additional cases in DECIPHER/ClinGen databases and additional cases from the literature with deletions involving 18q11-q12 enabled further refinement of regions for intellectual disability and conotruncal heart defect.[2] The occurrence of 2 patients with 18q deletions distal to *GATA6*, an important transcription factor associated with cardiac outflow tract development, suggested alternative genetic mechanisms for cardiac defects other than haploinsufficiency in these cases. Based on collective evidence, the critical region for "typical" de Grouchy syndrome as defined by short stature, delayed myelination, congenital aural atresia, food deformities, and characteristic facial features has been localized to a 70.6-74.9 Mb interval within the 18q22.3 to 18q23 chromosome region.

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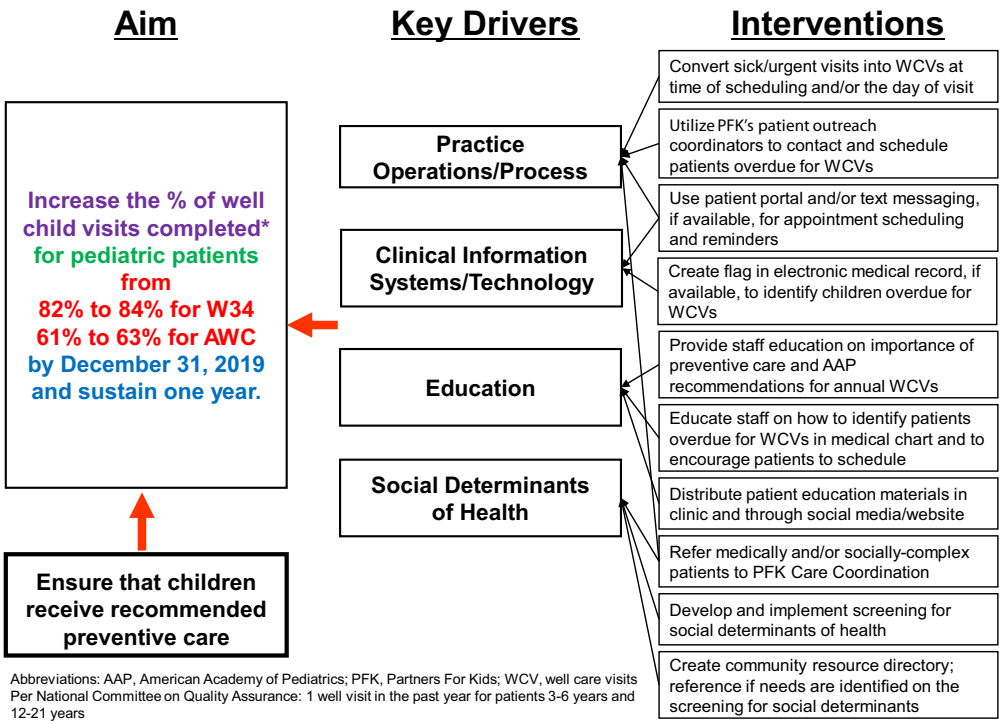

Figure 1. Template key driver diagram for a practice pursuing a QI project aimed at raising well care visit rates.

Table I. Codes used to identify well care visits

Current Procedural Terminology (CPT), 4th Edition	*International Classification of Diseases* (ICD), *10th Revision*
99381, 99382, 99383, 99384, 99385, 99391, 99392, 99392, 99393, 99394, 99395, 99461, G0438, G0439	Z00.00, Z00.01, Z00.110, Z00.111, Z00.121, Z00.129, Z00.5, Z00.8, Z02.1 Z02.2, Z02.3, Z02.4, Z02.5, Z02.6, Z02.71, Z02.79, Z02.81, Z02.82, Z02.83, Z02.89, Z029, Z76.1, Z76.2

Table III. Type of interventions implemented among practices participating in QI projects to improve well care visit uptake

	Practice characteristics ➢Rural vs urban ➢Practice model ➢Practice size	Duration of QI project (from 1/2017 to 12/2018)	Major interventions
1)	➢Urban ➢Physician-owned ➢≥10 providers	9 mo	1. Distribute patient education materials in clinic and/or through social media 2. Use EMR to identify children overdue for well care visits 3. Outreach to identify and schedule patients overdue for well care visits 4. Use patient portal and text messaging for appointment scheduling and reminders 5. Convert sick visits and follow-up visits into well care visits if overdue 6. Educate all office staff to identify patients overdue for well care visits and encourage scheduling
2)	➢Urban ➢Federally qualified health center ➢≥10 providers	24 mo	1. Outreach to identify and schedule patients overdue for well care visits 2. Use text messaging for appointment scheduling and reminders 3. Schedule next well care visits at check-out 4. Refer medically- and socially-complex patients to PFK Care Coordination 5. Create process for community partners to refer patients who need a primary care provider
3)	➢Urban ➢Physician-owned ➢3-9 providers	10 mo	1. Outreach to identify and schedule patients overdue for well care visits 2. Use EMR to identify children overdue for well care visits 3. Use text messaging for appointment scheduling and reminders 4. Schedule next well care visits at check-out 5. Convert sick visits and follow-up visits into well care visits if overdue
4)	➢Urban ➢Physician-owned ➢3-9 providers	19 mo	1. Use EMR to identify children overdue for well care visits 2. Outreach to identify and schedule patients overdue for well care visits 3. Schedule next well care visits at check-out 4. Convert routine follow-up visits into well care visits if overdue 5. Educate registration staff to identify patients overdue for well care visits and encourage scheduling 6. Create office policy to require annual well care visits for patients to receive medication refills
5)	➢Urban ➢Physician-owned ➢1-2 providers	6 mo	1. Distribute patient education materials in clinic and/or through social media 2. Use EMR to identify children overdue for well care visits 3. Outreach to identify and schedule patients overdue for well care visits
6)	➢Urban ➢Physician-owned ➢1-2 providers	6 mo	1. Distribute patient education materials in clinic and/or through social media 2. Use EMR to identify children overdue for well care visits 3. Outreach to identify and schedule patients overdue for well care visits 4. Educate all office staff to identify patients overdue for well care visits and encourage scheduling 5. Convert sick visits into well care visits if overdue 6. Create office policy to require annual well care visits for patients to receive medication refills
7)	➢Rural ➢Hospital-owned ➢≥10 providers	19 mo	1. Distribute patient education materials in clinic and/or through social media 2. Outreach to identify and schedule patients overdue for well care visits 3. Use patient portal and text messaging for appointment scheduling and reminders 4. Educate all office staff to identify patients overdue for well care visits and encourage scheduling 5. Extend office hours to improve access to care for patients 6. Convert sick visits into well care visits if overdue
8)	➢Rural ➢Hospital-owned ➢3-9 providers	18 mo	1. Distribute patient education materials in clinic and/or through social media 2. Develop and implement screening for social determinants of health 3. Outreach to identify and schedule patients overdue for well care visits 4. Schedule next well care visits at check-out 5. Convert routine follow-up visits into well care visits if overdue
9)	➢Rural ➢Physician-owned ➢3-9 providers	6 mo	1. Distribute patient education materials in clinic and/or through social media 2. Engage with community partners to raise patient awareness about well care visits importance 3. Create community resource directory and refer patients to available resources 4. Outreach to identify and schedule patients overdue for well care visits 5. Use EMR to identify children overdue for well care visits 6. Schedule next well care visits at check-out 7. Convert sick visits and follow-up visits into well care visits if overdue 8. Create office policy to require annual well care visits for patients to receive medication refills
10)	➢Rural ➢Physician-owned ➢1-2 providers	7 mo	1. Distribute patient education materials in clinic and/or through social media 2. Develop and implement screening for social determinants of health 3. Create community resource directory and refer patients to available resources 4. Refer medically- and socially-complex patients to PFK Care Coordination 5. Increase patient portal use for appointment scheduling and reminders 6. Schedule next well care visits at check-out 7. Outreach to identify and schedule patients overdue for well care visits 8. Educate all office staff to identify patients overdue for well care visits and encourage scheduling