



Aligning with Obesity Guidelines: A Quality Improvement Initiative in Pediatric Primary Care

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Objective National guidelines recommend diagnosis of obesity on the basis of body mass index starting at age 2 years and screening for specific comorbidities based on age and risk factors. A multimodal intervention was developed and quality improvement (QI) methodology was used to assess the effectiveness of different interventions on pediatric primary care clinician’s adherence to evidence-based clinical guidelines.

Study design A multidisciplinary team was engaged to develop an institutional weight management and diet-related disease toolkit to standardize practice through a QI initiative. This initiative included an educational series, coaching sessions for a subset of providers, and automating electronic medical record (EMR) changes to support adherence to the clinical toolkit. We staggered the interventions to assess for behavior change related to clinical documentation and laboratory test ordering practices.

Results Baseline data showed significant differences between individual clinicians’ practices. Educational initiatives increased the use of diagnostic obesity codes from a baseline of <20% to >75% of charts. Initially, *International Classification of Diseases, Tenth Revision*, codes for nutrition and physical activity counseling were underused and remained low despite education interventions. EMR prompts and templates led to a significant and sustained increase in coding. A statistically significant decrease in overall extraneous laboratory test collection was noted but inconsistencies in laboratory test collection persisted.

Conclusions This QI initiative aimed to standardize clinicians’ behavior around EMR documentation. A multimodal intervention was able to improve documentation of weight status and counseling measures to >80% of well child check encounters. Future studies are encouraged to investigate whether these changes led to improved patient outcomes. (*J Pediatr* 2024;14:200135).

Obesity is a chronic multifactorial disease that affects 1 in 5 youth.¹ It has been well documented that obesity itself is a risk factor for multiple chronic health conditions.² Professional association guidelines and policy statements exist to standardize best practice recommendations; however, the literature demonstrates that clinicians’ adherence to clinical practice guidelines for the assessment and treatment of pediatric obesity varies greatly.³⁻⁷

At the time of this project, our research team relied on the most-up-to date American Academy of Pediatrics (AAP) Expert Committee Recommendations on Child and Adolescent Overweight and Obesity released in 2007.^{8,9} After the conclusion of this project, the AAP published the Clinical Practice Guidelines for the Evaluation and Treatment of Children and Adolescents with Obesity in 2023.² Both guidelines outline strong evidence for the importance of identification and treatment of obesity on the basis of body mass index (BMI) percentiles starting at age 2 years, with primary care pediatricians playing a central role in identification and management of obesity and related comorbidities.^{2,8} The 2007 expert committee recommendations highlight a staged but limited approach to treatment with a combination of lifestyle, medication, and surgical interventions but was replaced by the 2023 recommendation for more immediate and intensive treatment options. The United States Preventive Services Task Force (USPSTF) screening recommendations on Obesity in Children and Adolescents published in 2017¹ were also used as a reference at the time of this quality improvement (QI) initiative. These recommendations differed in using the age of 6 years for initial BMI-based screening, but otherwise made recommendations consistent with the earlier AAP guidelines.¹ The USPSTF found that comprehensive intensive health behavior and lifestyle treatment with a total of 26 contact hours had the strongest evidence for the most effective outcomes when addressing obesity in the pediatric population.¹

A1C	Hemoglobin A1C	LP	Lipid panel
AAP	American Academy of Pediatrics	PDSA	Plan-Do-Study-Act
ALT	Alanine aminotransferase	QI	Quality improvement
BMI	Body mass index	USPSTF	United States Preventive
EMR	Electronic medical record		Services Task Force
HEDIS	Healthcare Effectiveness and	VBC	Value-based care
	Data Information Set	WCC	Well Child Checks

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The first fundamental step in addressing obesity and related comorbidities in children is appropriate identification and diagnosis. Early identification and preventive care fit within the evolving infrastructure of health care from fee-for-service towards more value-based care (VBC) models.¹⁰ VBC arrangements within health care organizations link financial incentives with specific quality metrics. The National Committee for Quality Assurance contracts with the Center for Medicare & Medicaid to set the Healthcare Effectiveness and Data Information Set (HEDIS) measures, which refers to the data that are tracked and measured to evaluate whether outcome measures are met. In 2020 and 2021 the National Committee for Quality Assurance included weight assessment and counseling for nutrition and physical activity during pediatric well child checks (WCCs) as a reportable quality measure.¹¹ These metrics are evaluated through claims analysis of coding data imported into the electronic medical record (EMR).

The absence of documentation within the EMR is a missed opportunity for both proper surveillance and reimbursement. In 2019, a mixed-methods study was conducted among pediatric primary care providers in Washington, DC, and its surrounding metropolitan area to explore clinicians' self-identified barriers to consistent adherence to current pediatric weight management recommendations.³ A majority of clinicians expressed discomfort in managing obesity, and more than 80% identified time constraint as a barrier to care.¹² From our discussion with clinicians within and around our institution, we identified several challenges to adhering to the standardized recommendations but also identified several opportunities to address these barriers.

Specific Aim

We formed a team to carry out a QI initiative aimed to improve provider adherence to the AAP and USPSTF screening recommendations for pediatric patients ages 2-18 years with a BMI $\geq$ 95th percentile being seen for WCC. Baseline data showed disparate practices regarding laboratory test collection, irrespective of age, as well as inconsistent documentation and billing practice across clinic sites. We set a goal to align practices across the 2 study sites with a 20% increase in appropriate coding for nutrition and physical activity counseling, BMI, and weight assessment along with a 20% increase in universal laboratory screening in patients ages 9-18 years in this population. At the time of this project, Children's National Hospital primary care division had a shared savings contract in place with Managed Care Organizations that used *International Classification of Diseases, Tenth Revision*, coding for BMI percentile and Current Procedural Terminology (CPT) coding for nutrition and physical activity counseling to track HEDIS measures. At the time this shared savings model set a target goal based on the percentage of member charts that achieved the 50th percentile or greater; which correlated to 80% of WCC documenting completion of weight assessment and counseling measures.

Methods

This QI project was approved by the Children's National Hospital Institutional Review Board as an exempt QI initiative. The team consisted of 3 pediatric physician-researchers (with 1 serving as principal investigator and another with certification by the American Board of Obesity Medicine), a pediatric resident physician, 6 medical students trained in QI methodology and EMR data collection, and an RN/MPH with certification in healthcare quality. Stakeholders were identified within relevant practice areas in the institution.

Through pilot research¹² and discussions with institutional stakeholders, it became clear that pediatric providers required more standardized guidance to create consistent management practices around addressing obesity and its related comorbidities. Using a cause-and-effect diagram, the QI team identified problems including lack of knowledge regarding coding for both BMI percentile and obesity diagnosis, inconsistent laboratory screening practices for weight-related comorbidities, and inconsistent documentation of counseling to indicate which patients received intensive health behavior and lifestyle treatment measures. These root causes helped us identify the key drivers that our QI team identified for areas of intervention (Figure 1).

The practice settings for the targeted intervention were 2 Children's National Hospital community health centers in Washington, DC. These 2 health centers are located within the Anacostia region of Southeast Washington, DC. This region is historically under-resourced, with more than 30% of residents living below the poverty line. These clinics were noted to have wide disparities in the documentation of obesity and comorbidities in earlier analysis.⁴ In total, Children's National Hospital has 6 community health centers throughout Washington, DC. Four of these did not receive site-specific coaching and were not included in the data set, however; the providers were able to access the educational materials, institutional algorithms (Supplement 1, online; available at www.jpeds.com), and patient handouts developed throughout the initiative. Participation and practice change were not mandatory but encouraged, with an additional incentive of Maintenance of Certification Quality Improvement Part 4 credit for participation offered.

Baseline data were collected from 330 randomly selected patient records from the 2 clinics (165 charts from each clinic) between February 2020 and February 2021. Visits for WCC of patients aged 2-18 years old with a documented BMI $\geq$ 95th percentile were eligible for review. These charts were evenly divided between age groups: 2-8 and 9-18 years on the basis of risk stratification outlined in our institutional algorithm (Supplement 1, online; available at www.jpeds.com). Fifteen eligible encounters per site per month were selected with a goal of 360 records; however, this data collection was disrupted by the COVID-19 pandemic, which led to the team to extend collection to a 13-month interval as 2 of those months (March and April 2020) did not include any WCC visits in this age group.

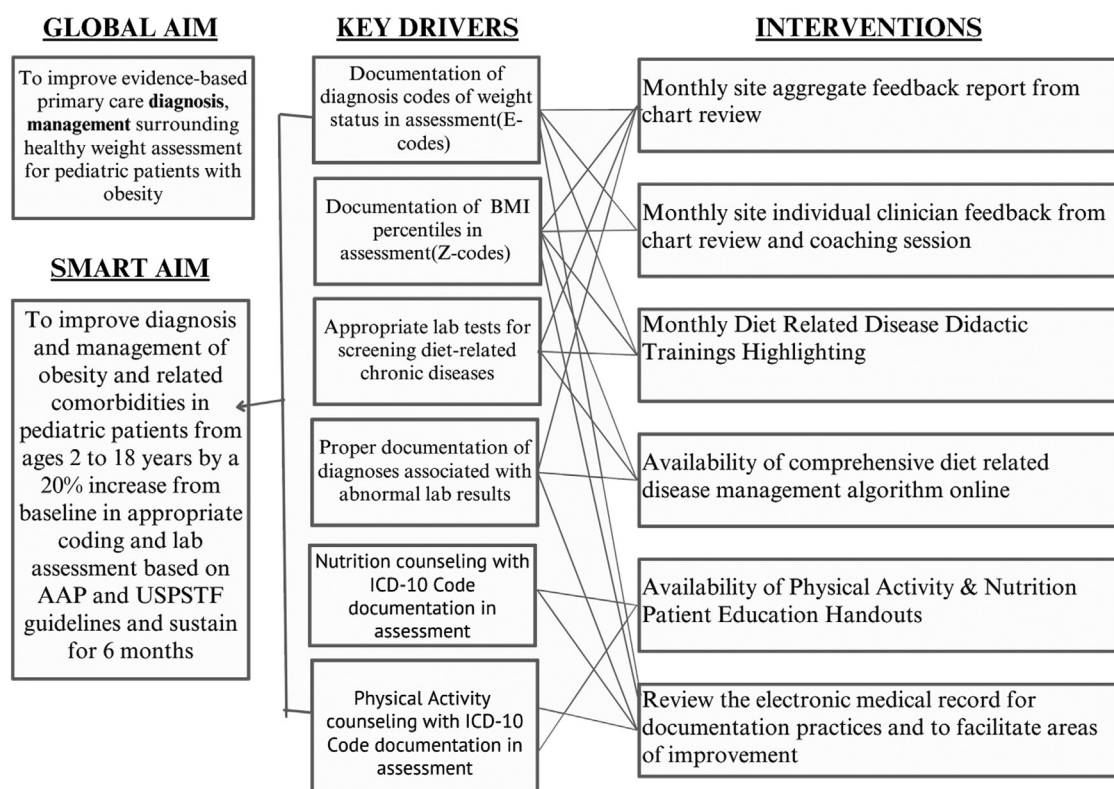


Figure 1. Key driver chart for quality improvement initiative for weight- and diet-related chronic disease management in pediatric primary care.

The intervention period occurred between March 2021 and March 2022. During the intervention period, approximately 100 charts were reviewed monthly, and charts were selected using a random number generator. Ongoing chart reviews occurred between April 2022 and September 2022 to monitor for a 6-month sustainment period after the active intervention.

QI Framework

The QI team developed a key driver diagram to outline the facilitators of improvement and tests of change to achieve the desired project aim (Figure 1). The Plan-Do- Study-Act (PDSA) model was implemented to guide tests of change around specific interventions and monitor for sustainability. We conducted 5 PDSA cycles during the first 6 months of the initiative (Table 1).

We tracked the following process measures: (1) documentation of BMI percentiles using z codes; (2) documentation of diagnosis codes associated with weight status using E-codes; (3) ordering of appropriate screening laboratory tests on the basis of current guidelines; and (4) documentation and coding of nutrition and physical activity counseling (Supplement 2, online; available at www.jpeds.com).

Our primary outcome measures were to (1) achieve WCC containing accurate coding for BMI, weight status, and physical activity and nutrition counseling and (2) demonstrate documentation of appropriate screening laboratory tests on

the basis of on age and risk factors at WCC. A secondary outcome measure was a reduction in extraneous laboratory test collection. Education interventions were introduced in staggered phases throughout the active intervention period (March 2021-March 2022). Monthly individual provider chart audits at the 2 selected community health centers occurred during the first 6 months to help identify whether targets were being met or if additional interventions were warranted. If outcome measures were not showing a positive trend monthly educational initiatives and coaching sessions were tailored to ongoing needs.

Interventions

At the start of the project, we provided all pediatric primary care clinicians with access to the Children's National Hospital Clinical Pathways for Weight and Diet Related Chronic Disease Management Algorithm Toolkit. This was created by our QI team and institutional subspecialty departments to align national guidelines with current institution-specific resources, recommendations, and workflows. This toolkit served as a reference document from which multimodal educational initiatives were introduced (Table 1). We reviewed all materials and presentations for possible weight bias and ensured the use of patient-first language. All educational sessions would begin with a reminder regarding language sensitivity when counseling around obesity and health behaviors.

Table 1. Plan-Do-Study-Act cycles and implementation planning for weight and diet-related chronic disease management in pediatric primary care QI initiative

PDSA cycles	Intervention
Cycle 1: 2/2021	Initial staff training: Introduction of the project aims and how to use appropriate codes in clinical documentation to document that weight assessment and lifestyle behaviors (nutrition and activity) were addressed. Clinical toolkit including clinical screening and laboratory assessment recommendations introduced.
Cycle 2: 3/2021	Monthly training sessions: Monthly education sessions started, open to all primary care staff, where relevant subspecialists highlight individual topics from within the weight management toolkit with a focus on understanding universal laboratory screening recommendations vs tailored risk-based screening.
Cycle 3: 5/2021	Situation-Background-Assessment-Recommendation (SBAR) framing provided: Memo to all primary care staff on institutional recommendation for E code to accompany Z code to meet claims criteria for obesity diagnosis
Cycle 4: 6/2021	Large group staff training: Live conference, followed by a shared recording, reviewed the initial goals and included a coding expert to share effective billing/coding strategies.
Cycle 5: 7/2021	Individual coaching feedback: Individual provider practice was noted to be inconsistent, 16 providers at the 2 selected clinical sites had individualized feedback on laboratory collection practices and coding to monitor for improvement.
Cycle 6: 8/2021	EMR changes: ECW (E-Clinical Works) outpatient EMR removed “morbid obesity” as a diagnosis label for E66.01 and replaced it with “severe obesity”; also included a pop-up prompt to enter the diagnosis E code when a BMI surveillance Z code was entered. ***3/2022 – EMR templates for nutrition and activity counseling including billable codes were implemented (time delay due to administrative approval process for new templates)

Our baseline data showed that 30% of providers at clinic 1 and 52% of providers at clinic 2 were using the Z code as a stand-alone code when counseling for obesity. The VBC benchmark set a goal for >80% of WCC BMI percentile and weight assessment diagnosis through Z- and E-code usage. Less than 40% of charts reviewed included both E and Z codes at baseline (Figure 2). In addition, charts were reviewed to examine documentation of institutionally recommended physical activity and nutrition counseling codes to support standard nutrition and physical activity counseling behaviors already completed and documented in EMR. Nearly zero charts reviewed at clinic 1 and about 10% at clinic 2 included billable codes (Physical Activity Counseling: Z71.82; Nutrition Counseling: Z71.3) for nutrition and physical activity counseling that were provided in the descriptive text. We monitored the interventions for effectiveness and found educational initiatives alone were able to increase E- and Z-code use well above our target, with both clinics averaging >50% increase in E- and Z-code documentation above baseline measures. However, despite the educational initiative also highlighting the use of nutrition and activity counseling codes, no consistent change in documentation habits was observed. This led to an adjustment in intervention. Our team worked with organizational leadership to optimize the EMR through automated reminders and changes to the routine WCC templates as computer based reminders are known to be an effective tool in ambulatory care.^{13,14} WCC templates that included codes for nutrition and physical activity counseling were made available as institution wide EMR templates and could be selected when counseling was completed. As a result of the coordination required to implement these structural changes, they did not go live until March 2022 in the last month of our active intervention. The outcome of this change was tracked during the 6-month sustainment period (Figure 3).

Data Analysis

Descriptive statistics are used to characterize the sample characteristics, and chart review (Supplement 2, online; available at www.jpeds.com) was used to collect the sample data. All patients ages 2-18 years who were seen by participating providers for preventive well checks within the intervention period as described above were eligible for chart review. We performed age group subanalysis using parameters on the basis of recommendations for laboratory test screening stratification; ages 2-8 years and ages 9-18 years. Per QI methodology, tests of change were implemented using PDSA cycles and run charts were used to monitor change over time.

Categorical outcomes were reviewed throughout utilizing numbers and percentages (%) for comparison. Statistical process control charts were used to track our progress. Run charts were used to monitor the effect of individual interventions over time. The charts were developed using Microsoft Excel.

Results

Baseline data showed discrepant individual provider practices across all process measures. Baseline use of ideal use of both E and Z obesity diagnosis coding averaged 15% at clinic 1 and 40% at clinic 2. After project launch, there was a steady increase in appropriate E and Z coding exceeding our target goal, with both clinics maintaining >80% use of appropriate coding through the sustainment period (Figure 2). Lower rates of nutrition counseling and activity counseling Z codes were used at baseline. A modest increase in use was noted across PDSA cycles but did not meet the target. After adapting the intervention to include EMR automation the number of charts with appropriate coding rapidly improved to a maximum of

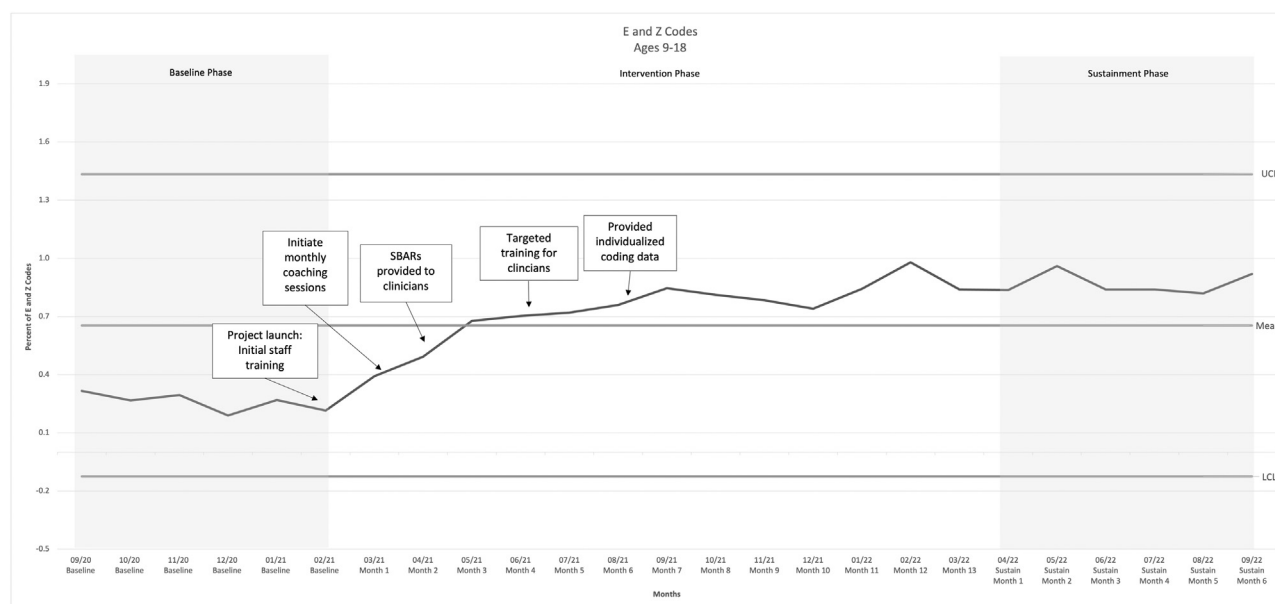


Figure 2. Control chart with percentage of charts with E and Z obesity codes documented at WCCs for patients ages 9-18 years with a BMI $\geq$ 95th percentile. *Percentage averaged between clinic 1 and clinic 2.

96% for both nutrition and physical activity counseling by the end of the study period (Figure 3).

During our baseline chart review and individual provider audits, we noted disparate practice differences in the initial age at which obesity-related screening laboratory tests were obtained. The clinical algorithm (reference sample Supplement 1, online; available at www.jpeds.com) provided during the initiative recommended that patients 9-18 years with obesity on the basis of BMI screening have

nonfasting lipid panel (LP), A1C (A1C), and alanine aminotransferase (ALT) drawn during their WCC. Baseline chart review showed an average of 56% had a LP, 67% had an A1C, and 31% had an ALT appropriately drawn at routine WCC. During the intervention, we were able to note an upward trend compared with baseline but only the ALT achieved the 20% increase from baseline benchmark goal. These increases were maintained after the active intervention period (Figures 4 and 5).

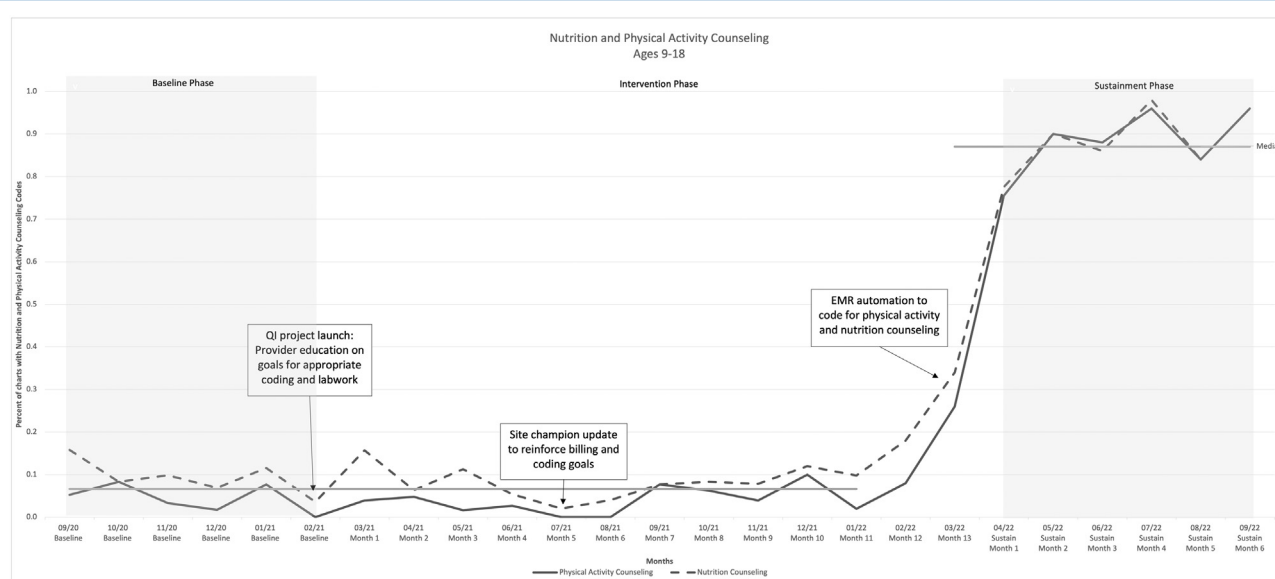


Figure 3. Run chart with percentage of charts with nutrition and activity counseling codes documented at WCCs for patients ages 9-18 years with a BMI $\geq$ 95th percentile. *Percentage averaged between clinic 1 and clinic 2.

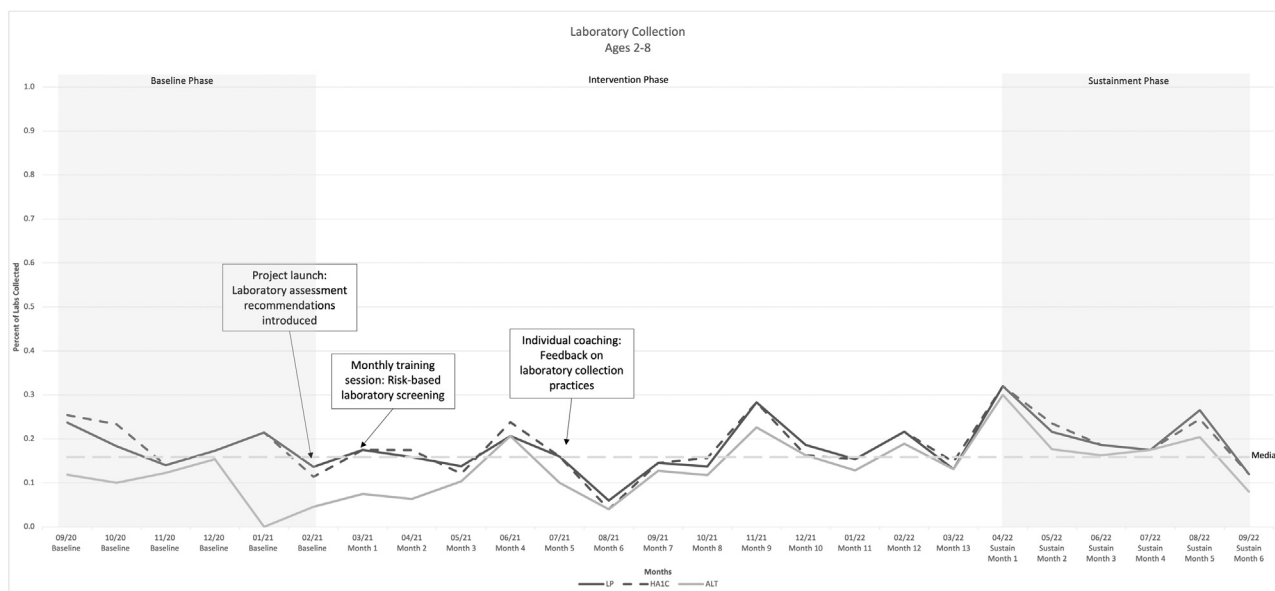


Figure 4. Run chart with percentage of LP, A1C, and ALT collected at WCCs for patients ages 2-8 years with BMI ≥ 95 th percentile.

Conversely, for children ages 2-8 years, laboratory screening was not recommended by our institutional guidelines if the sole risk factor is obesity on the basis of BMI. The clinical algorithms outlined specific clinical indications for screening at younger ages, and these were taken into account during chart review in determining appropriate ordering practices (Supplement 2, online; available at www.jpeds.com). At baseline approximately 55% of children ages 2-8 years who had LP, A1C, and ALT drawn did not have

any additional documented risk factors. No significant reduction in laboratory test collection in this 2- to 8-year age group (Figure 4) was found.

We also tracked several other extraneous laboratory test s that were commonly collected by providers on patients with a diagnosis of obesity (Supplement 2, online; available at www.jpeds.com). For ages 2-8 years, these extraneous laboratory tests were present in as many as 5% of charts, but nearly all monitored laboratory tests except glucose, which

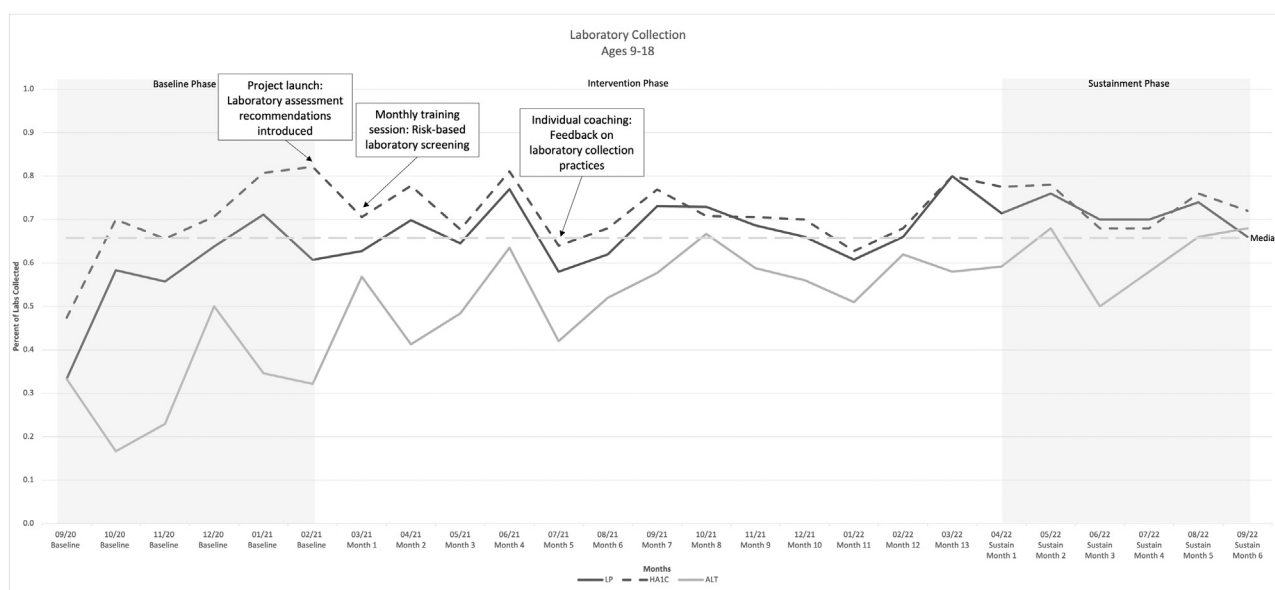


Figure 5. Run chart with percentage of LP, A1C, and ALT collected at WCCs for patients ages 9-18 years with BMI ≥ 95 th percentile.

Table II. Percentage of extraneous* laboratory tests collected at well child checks for patients with BMI $\geq$ 95th percentile

Extra laboratory tests	Baseline period	Intervention period	Sustainment period
Ages 2-8 y			
AST	2.9%	0.8%	0%
Glucose	0%	1.2%	2.9%
CMP	5%	1.2%	0.9%
TSH	1.2%	0.7%	0.6%
Vitamin D	1.7%	0.3%	0%
Independent LDL	0.5%	0.3%	0%
BMP	0.2%	0.2%	0%
Independent cholesterol	0.5%	0.3%	0%
Hepatic panel	0%	0.0%	0%
Ages 9-18 y			
AST	14%	4.3%	1.4%
Glucose	2.2%	5%	7.4%
CMP	19%	6.4%	2.3%
TSH	3.1%	4.2%	2.6%
Vitamin D	2.4%	4.2%	4%
Independent LDL	3.5%	1.6%	0.3%
BMP	0.4%	0.2%	0%
Independent cholesterol	5%	1.9%	0.3%
Hepatic panel	1.7%	0.0%	0%

AST, aspartate aminotransferase; BMP, basic metabolic panel; CMP, complete metabolic panel; LDL, low-density lipoprotein; TSH, thyroid-stimulating hormone.

*Considered extraneous if no other clinical documentation was provided to justify laboratory test collection or documented solely under the diagnosis of "obesity" with no supporting text to indicate a clinic need in the medical record.

was noted to trend upward, decreased during the intervention and sustainment period (Table II). For ages 9-18 years, the most common extraneous laboratory test, the Complete Metabolic Panel (CMP) was present in 19% of charts. There was a trend toward screening with an isolated ALT as recommended during the intervention instead of a full CMP, whereas ordering practices around thyroid-stimulating hormone and vitamin D were not found to change (Table II).

Discussion

We outline a QI initiative developed to address barriers to implementing appropriate clinical guidelines around the diagnosis and management of pediatric obesity and its related comorbidities in primary care. The goal was to support behavior change to better align individual practices with evidence-based guidelines and VBC measures through educational and institutional support. This project was conducted through a network of large urban academic primary care centers with strong subspecialty alignment.

We saw improvement in 3 of our 4 process measures. We met or exceeded benchmark goals for improvements in the utilization of E and Z codes (Figure 2), appropriate coding and documentation of nutritional and physical activity counseling (Figure 3), and decrease in the number of charts with extraneous laboratory tests at both clinics (Table II). However, we failed to observe a statistically significant improvement in age-appropriate laboratory test

collection (Figures 4 and 5). Although there was an upward trend for appropriate laboratory test collection in the 9- to 18-year age group, no change was observed in the younger age group.

We began to see a meaningful change in coding practices shortly after project launch, with upward inflections seen at the launch of each PDSA cycle (Figure 2). PDSA cycle 1 and 2 focused on educational initiatives targeted directly at clinicians, given the known gaps from our own institution,^{4,12} which align with several other studies¹⁵⁻¹⁷ that confirm pediatric primary care providers often fail to document obesity or health behavior counseling. It is notable that there was an immediate increase in appropriate coding for BMI percentile and weight assessment but not for physical activity and nutrition counseling, despite standard nutrition and physical activity counseling behaviors being documented within the text of the WCC note. One possible reason for this finding may be that practicing clinicians have established habits around routine documentation of diagnosis codes but not around using counseling and surveillance codes, although no specific qualitative data were obtained to explain this discrepancy. Once EMR supports were put in place with available templates and automated coding reminders we saw both clinics reach >95% use and maintenance throughout the 6-month sustainment period. These findings support the use of a multimodal approach when encouraging practice change. Although provider education is a critical step, organizations must use technology to maximize efficiency and not place the sole burden on clinicians in this rapidly changing health care landscape. This supports findings in other studies that reinforce the importance of EMR tools in modern health care.¹⁴

This QI initiative was able to support clinicians in meeting our organizations HEDIS measure benchmark. Although we were unable to obtain specific reimbursement data, we theorize that these clinical management tools and improved billing practices can enable reimbursement for time spent providing the recommended level of care.

Laboratory screening patterns appeared to be individualized and persisted despite the QI initiative, with particular resistance to limiting screening in the younger 2-8 age group. We did see a positive trend in overall universal screening for patients 9-18 years but only ALT screening reached our benchmark (Figure 5). There was an overall decrease in extraneous laboratory test collection that reached statistical significance. A similar QI initiative conducted by Satti et al¹⁸ was noted to also have lower adherence to obesity documentation and management practices in patients aged 2-5. Although specific barriers to adherence are not fully known, we hypothesize that unique barriers to clinical obesity management include stigma, provider-patient discordance, and socioeconomic factors that may feel heightened when addressing families of young children.

Limitations

Our QI initiative had some limitations. The intervention took place at primary care health centers affiliated with a large urban academic institution with an existing continuing medical education structure. However, we believe this initiative could serve as a model for different practice settings by highlighting small but frequent education initiatives tailored to individual practice needs that could be bolstered by institutional EMR automation.

Time constraints during outpatient visits are a recognized barrier in the literature to providing effective screening and counseling to address obesity.^{3,19,20,21} We were unable to determine whether this intervention reduced or increased burden on participants. The QI initiative provided more streamlined access to guidelines as well as a toolkit of resources to reduce the burden of counseling solely on the clinician, but we recognize that encouraging further counseling may increase the time needed for face-to-face patient contact.

This study did not examine whether providing and documenting counseling around weight status, nutrition, or physical activity recommendations led to a change in patient outcomes. Additional research is needed to further investigate whether a change in provider practices influences patient health metrics.

Conclusions

In summary, we showed improvement in adherence to modified AAP guidelines for diagnosing and managing obesity and its related comorbidities after a 1-year QI initiative. We were able to demonstrate sustainment of these practice changes after our active measures had ended. We theorize that the main drivers leading to this initiative's success include the extensive education provided to practitioners, the detailed institution supported toolkit, and the automation of the EMR. Health care providers encounter various barriers that can interfere with addressing obesity and its related comorbidities, and health care systems are increasingly recognizing that provider and office level system support within the EMR can improve adherence to preventive recommendations while meeting local VBC measures, which continue to change over time. Additional EMR automations during routine WCC with laboratory order sets delineated by age group would likely address the disparities seen in laboratory ordering practices.

Overall, this initiative showed that customizable approaches to aligning institutional resources with national guidelines and quality metrics can support individual practice change and be sustained over time. This provides a model to continue to standardize pediatric obesity care across our broader health care network. ■

CRedit authorship contribution statement

Alicia Tucker: Writing – review & editing, Writing – original draft, Supervision, Resources, Project administration, Methodology, Investigation, Formal analysis, Conceptualization. **Richard Fagbemi:** Writing – original draft, Project

administration, Data curation. **Christina Driskill:** Writing – review & editing, Software, Methodology, Formal analysis. **Nia Bodrick:** Writing – review & editing, Supervision, Project administration, Investigation, Conceptualization. **Kaleab Ribbiso:** Writing – review & editing, Investigation, Data curation. **Abraham Ipe:** Investigation, Data curation. **Meera Krishnamoorthy:** Investigation, Data curation. **Adwoa Bamfo:** Investigation, Data curation. **Kofi Essel:** Writing – review & editing, Validation, Supervision, Resources, Project administration, Investigation, Conceptualization.

Declaration of Competing Interest

The authors declare no conflicts of interest.

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