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# Clinical Quality Improvement for Identification and Management of Overweight in Pediatric Primary Care Practices

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## Abstract

The purpose of the Pediatric Overweight Quality Improvement Initiative (POWQII) was to demonstrate the feasibility and value of simple interventions for improving pediatric care and to address the additional needs of overweight and obese children. Practices were recruited from around New Mexico, with 16 pediatricians completing the POWQII within 9 to 12 months. Initially, documentation of BMI percentile across all practices was only 49%, increasing to more than 90% on average following the first intervention and eventually reaching an average of 99%. Nutrition and physical activity counseling started at 52% and 39%, respectively, increasing to 87% for nutrition and 77% for physical activity. Diagnosis of POW patients improved over the course of the POWQII (67% to 94%). This intervention's potential impact can extend to a larger population of patients, resulting in twice as many receiving screening for POW and increasing best practices known to improve ongoing care and patient outcomes.

## Keywords

pediatric overweight, pediatric obesity, quality improvement, model for improvement, maintenance of certification, PDSA, BMI percentile, motivational interviewing, telehealth

## Background

Childhood overweight and obesity is not a new issue in the United States, with prevalence increasing significantly from 2003 to 2007.<sup>1,2</sup> National survey results indicate that nearly one-third of children in the United States have a body mass index (BMI) percentile above the healthy weight range, with nearly half of those children meeting the criteria for an obesity diagnosis.<sup>1,3</sup> The overall prevalence of obese children aged 10 to 17 years in New Mexico is 32.7%, slightly higher than the national percentage in this same age group.<sup>3</sup> However, American Indian kindergarteners in New Mexico have approximately 3 times the obesity prevalence of white non-Hispanic kindergarteners and almost 16% higher than that of Hispanic kindergarteners.<sup>4</sup> Regardless of ethnic group, a significant acceleration of weight gain in early childhood has occurred in New Mexico, with the obesity rate for third-grade children being nearly double that for kindergarteners.<sup>4</sup>

Early onset of an elevated BMI increases the risk for overweight in later childhood and adolescence. Nader et al<sup>5</sup> found that children who had an overweight BMI at least once during the preschool age period were more than 5 times as likely to be overweight at 12 years compared with their healthy-weight counterparts. An overweight adolescent has a 70% chance of being overweight or obese as an adult, making early screening and prevention critical.<sup>6</sup> Screening is also important when assessing an overweight or obese child's risk of comorbidities. Overweight and obese children are most immediately at risk for high cholesterol, type 2 diabetes, and high blood pressure, all of which are potential precursors to heart

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disease. Children themselves perceive social discrimination as a prominent and realistic consequence, which can be associated with additional immediate problems, such as low self-esteem and depression.<sup>6</sup>

The evidence reveals that a large percentage (as much as 90%) of this population is not appropriately diagnosed, despite clear BMI definitions, corresponding diagnostic codes, and detailed clinical recommendations of assessment of childhood overweight and obesity.<sup>7-10</sup> Clinicians often misperceive weight classification by visualization alone.<sup>8,11</sup> Quality improvement (QI) is seen as a mechanism to assist providers to consistently use defined "best practices" by changing both behaviors and underlying systems of care.<sup>12</sup> The Model for Improvement (MFI) is a framework designed to organize the change process and accelerate the process of determining whether changes were an improvement or not. QI is most effective when small changes are made, with frequent measurable tests to evaluate if the change was successful or needs modification or if a new route is required. Genuine improvements are most likely to be achieved when there are specific aims, coupled with repeated measurements of performance such as those derived from the American Academy of Pediatrics (AAP).<sup>9,12</sup> Batalden and Davidoff<sup>13(p3)</sup> assert that "everyone in health care has two jobs when they come to work: to do their work and to improve it." Accurate assessment using BMI is central to identifying and meeting the needs of all children.

In response, QI methods have been used to address the need for improvement in pediatric practices addressing overweight and obesity. Examples include programs in Utah and Washington that each focused on improving prevention, identification, and treatment of childhood obesity in the pediatric primary care setting.<sup>14,15</sup> Similarities of these examples included using expert committee recommendations to guide improvement measures, the specific use of motivational interviewing (MI) techniques, and monthly feedback reports. Both started with a learning workshop and used the MFI as the QI framework but adopted differing approaches to implementation. In the Utah initiative, teams developed their own aims, measures, and methods for identifying potential resulting improvements. The Washington initiative established measures that consisted of percentage of patients with BMI measured, weight classification, receiving healthy lifestyle messages, assessment of readiness and/or self-management goal, documented race/ethnicity, and planned follow-up. Teams in both initiatives were assisted by a QI coach during multiple site visits and monthly coaching calls. Teams responded positively to information presented at learning sessions, later reflected in improvements around recorded BMI

percentile and conveying anticipatory guidance and healthy messages.<sup>14,15</sup>

## Methods

Envision New Mexico's (Envision NM) Pediatric Overweight Quality Improvement Initiative (POWQII) complies with the American Board of Pediatrics Maintenance of Certification (MOC) Performance in Practice (part 4) standards. Under MOC, pediatricians are required to demonstrate competence in systematic measurement and improvement in patient care through participation in and completion of QI initiatives and activities.<sup>16</sup> The purpose of Envision NM's POWQII was to demonstrate the feasibility and value of QI for improving pediatric care and to address the additional needs of overweight and obese children.

Envision NM recruited pediatric practices from around New Mexico. A total of 5 sites were selected to participate in the 2010-2011 initiative: 2 practices from the southern part of the state, 1 from the northwest region of the state that serves many American Indian patients, and 2 primary practices from the Albuquerque metro area. Among these 5 practices, 16 of 21 participating pediatricians completed the QI initiative. The POWQII was designed to be completed within 9 to 12 months. QI coaches from Envision NM staff started the initiative with a 4-hour training held in each of the 3 communities where participating practices were located.

## Intervention

The training included an overview of pediatric obesity and its impact in New Mexico, an orientation to the clinical guidelines for obesity medical management, a review of the measures in the POWQII, and identification of these measures through a medical record review. Participants were introduced to QI and MFI methodology. The objective of the training was to orient participants to using the Plan-Do-Study-Act (PDSA) cycle and aim statements to guide and define their improvement process. Subsequently, baseline data were used to develop the first PDSA cycle.

Envision NM provided a number of avenues of support during the POWQII. On-site MI training was required during the first 3 months of the project to improve provider skills around assisting patient and family self-management goal setting. MI is emphasized in clinical guidelines as an essential component of patient-centered communication and is a method of nonjudgmental elicitation of patient motivation.<sup>9</sup> Prior to the POWQII, only about one-fourth of participants had received formal MI training. In all, 19 providers

completed the basic MI training, a site with 3 providers completed an additional advanced training, and 1 provider requested and received a one-on-one training during clinical practice.

To extend access to specialty expertise in the state, Envision NM supports a telehealth clinic, with a focus on multidisciplinary didactic education and patient consultation specific to issues of pediatric overweight medical management. Participants in the POWQII were expected to provide 3 patient presentations over the course of the program and participate in presentations by specialists in pediatric endocrinology, nephrology, cardiology, hepatology, child and adolescent psychiatry, pediatric nutrition, and MI. This twice-monthly clinic had 72 participants during the course of the POWQII. Coaching calls were offered to each site on an individualized basis. The coaching calls served to review data about improvement and to formulate subsequent PDSAs. Supplemental support in the form of calls or site visits was available to address needs such as techniques to obtain an accurate blood pressure, determine a blood pressure percentile, and incorporate key messaging into a well-child check; using MI to set a self-management goal; and the importance of drawing labs on high-risk patients.

### Evaluation

Review of selected medical records provided the basis for evaluation of improvement. Participants were required to submit, within 2 weeks of the training, baseline reviews of a sample of medical records from well-child visits for patients aged 2 to 18 years, occurring up to 1 year prior to the training. The medical record review also collected the visit date and patient age at visit to confirm eligibility of cases. A random process (simple or systematic) from among all patient well visits was used to select records for review from a specified time interval, and reviews were completed by staff and physicians at each site. The completed record review forms were submitted to Envision NM for review and processing. The forms included brief definitions and related instructions for coding each measure.

Sites received data reports after each data set was submitted. Reports provided feedback about each data measure in the form of run charts and narrative explanations. The reported feedback informed each site about the outcome of the quick-cycle PDSA currently being evaluated. It also provided incremental information about performance; with the final report showing each site's improvement over the entire QI initiative. Envision NM provided annual reports of overall progress on the POWQII to the American Board of Pediatrics.

POWQII measures of quality were based on clinical guidelines defined by the 2007 Expert Committee Recommendations.<sup>9</sup> Annual assessment of BMI percentile and counseling for nutrition and physical activity for all patients were also consistent with the 2009 Healthcare Effectiveness Data and Information Set.<sup>17</sup> For patients with a BMI percentile  $\geq 85\%$ , the POWQII added weight category diagnosis and assistance with setting a "self-management goal," along with scheduled follow-up visits, referrals, and lab work, where indicated. Measures expected for all patients included the following:

1. BMI percentile: calculated from the patient's height and weight and referenced against age- and sex-specific norms, providing an initial screen at each well visit.
2. Lifestyle counseling:
  - a. Counseling for nutrition: specified as discussion about more fruits and vegetables, less sweetened beverages, increased water intake, breakfast daily, and/or less fast food
  - b. Counseling for physical activity: included discussing less screen time and more physical activity

Counseling of lifestyle behaviors is important for children of all weight classifications because it is an essential aspect of health promotion and obesity prevention.<sup>9</sup>

When POWQII participants achieved 90% proficiency on BMI percentile and lifestyle counseling, they shifted focus to improving practices of particular relevance for overweight and obese patients. Measures that should apply to all high-risk patients included the following:

1. weight category diagnosis: a specific diagnosis based on BMI percentile cutoff points of 85th and 95th percentiles, indicating overweight and obese, respectively;
2. self-management goals: development of a patient's self-management goals suggests that the provider is working with the family to define patient-determined changes to improve health, which is often influenced by MI techniques;

Measures that are optional based on medical need included the following:

3. referral: defined overweight-related referrals include nutrition, community programs, physical therapy, mental health, and other subspecialties (renal, cardiology, gastroenterology,

**Table 1.** Improvement for All Patients by Medical Record Review.<sup>a</sup>

Practice		1	2	3	4	5	Overall
A	Total records reviewed	30	30	29	30	30	(1-5)
	BMI Percentile Documented (%)	0 (00.0%)	30 (100.0%)*	29 (100.0%)	29 (96.7%)	30 (100.0%)	—***
	Counseling for nutrition Documented (%)	14 (46.7%)	16 (53.3%)	23 (79.3%)*	29 (96.7%)*	30 (100%)	—***
	Counseling for physical activity Documented (%)	8 (26.7%)	14 (46.7%)	23 (79.3%)*	29 (96.7%)*	30 (100.0%)	—***
B	Total records reviewed	20	20	20	30	20	
	BMI percentile Documented (%)	6 (30.0%)	17 (85.0%)*	19 (95.0%)	27 (90.0%)	20 (100.0%)	—***
	Counseling for nutrition Documented (%)	10 (50.0%)	12 (60.0%)	18 (90.0%)*	29 (96.7%)	18 (90.0%)	—**
	Counseling for physical activity Documented (%)	9 (45.0%)	9 (45.0%)	16 (80.0%)*	27 (90.0%)	18 (90.0%)	—**
C	Total records reviewed	25	20	20	20	30	
	BMI percentile Documented (%)	17 (68.0%)	20 (100.0%)*	20 (100.0%)	20 (100.0%)	30 (100.0%)	—***
	Counseling for nutrition Documented (%)	19 (76.0%)	15 (75.0%)	19 (95.0%)	17 (85.0%)	27 (90.0%)	NS
	Counseling for physical activity Documented (%)	8 (32.0%)	7 (35.0%)	14 (70.0%)*	13 (65.0%)	22 (73.3%)	—**
D	Total records reviewed	50	50	45	50	49	
	BMI percentile Documented (%)	30 (60.0%)	50 (100.0%)*	45 (100.0%)	50 (100.0%)	49 (100.0%)	—***
	Counseling for nutrition Documented (%)	26 (52.0%)	37 (74.0%)	35 (77.8%)	49 (98.0%)*	41 (83.7%)*	—***
	Counseling for physical activity Documented (%)	27 (54.0%)	32 (64.0%)	29 (64.4%)	35 (70.0%)	37 (75.5%)	—*
E	Total records reviewed	30	30	34	29	20	
	BMI percentile Documented (%)	23 (76.7%)	24 (80.0%)	31 (91.2%)	26 (89.7%)	19 (95.0%)	NS
	Counseling for nutrition Documented (%)	12 (40.0%)	11 (36.7%)	12 (40.0%)	10 (30.3%)	13 (65.0%)*	NS
	Counseling for physical activity Documented (%)	8 (26.7%)	6 (20.0%)	3 (10.0%)	9 (27.3%)	8 (40.0%)	NS
All practices	Total records reviewed	155	150	148	159	149	
	BMI percentile Documented (%)	76 (49.0%)	141 (94.0%)	144 (97.3%)	152 (95.6%)	148 (99.3%)	
	Counseling for nutrition Documented (%)	81 (52.3%)	91 (60.7%)	107 (74.3%)	134 (82.2%)	129 (86.6%)	
	Counseling for physical activity Documented (%)	60 (38.7%)	82 (54.7%)	85 (59.0%)	113 (69.3%)	115 (77.2%)	

<sup>a</sup>\* $P \leq .05$ ; \*\* $P \leq .01$ ; \*\*\* $P \leq .001$ .

sleep study, ear, nose, and throat, etc). Because referrals can vary greatly based on clinical judgment, there was no expectation that all high-risk children receive a referral;

4. follow-up visits: primary care follow-up, determined by the patient's individual needs, were tabulated when follow-up was intended at the visit being reviewed; and
5. laboratory testing: it is recommended that all overweight or obese children receive lipid panel testing, and if risk factors are present, then, additional testing based on age.

## Results

A minimum of 30 charts and 6 record reviews, including baseline, were planned for each site. A sample of 30 records was intended to provide sufficient statistical power to detect differences of 30% or greater improvement above baseline, when the baseline value is 10% or less ( $\alpha = .05$ ,  $\beta = .20$ , 2-tailed test). An expected minimum of 5 records per provider meant that in larger practices, the overall sample sizes would exceed 30 records. Statistical evaluation, using the *t* test, was done for relative changes in the proportion of correct responses between each subsequent review of data or overall, as indicated. All analyses were performed using the Statistical Package for the Social Sciences, version 16.

All practices involved in the 2011 POWQII provided 5 medical record reviews—a baseline and 4 follow-up reports—totaling 761 medical records reviewed. Two sites completed a sixth review with 69 additional cases, but these last cases are not included in the analysis. The number of cases at each review was relatively consistent (ranging from 148 to 159) across the 5 practices. The overall number of cases reviewed by sites varied (ranging from 110 to 244), in part reflecting the number of providers in each site (ranging from 2 to 5).

### BMI Percentile

The average rate at baseline for documentation of BMI percentile across all practices was only 49%. This increased to more than 90% on average following the first intervention and reached an average of 99% after 5 medical record reviews (see Table 1). Although practices started at differing levels of performance (from 0% to 77%), it is important to note that this pattern of improvement was consistent across all 5 sites (Figure 1). The improvements from first to second reviews were statistically significant for all but site E, which was hampered by the small sample sizes at each review. Moreover, site E started at 77% and reached 95% at the final review, limiting the size of improvements possible between any 2 reviews.

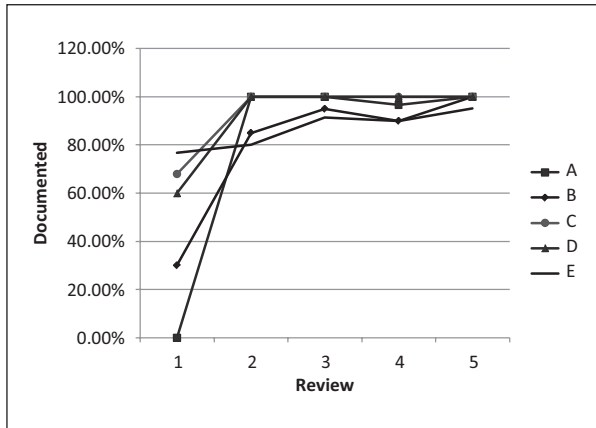


Figure 1. BMI percentage improvement by site.

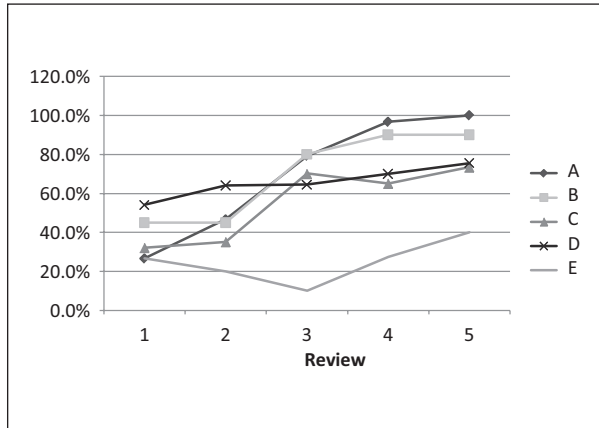


Figure 3. Counseling for physical activity improvement by site.

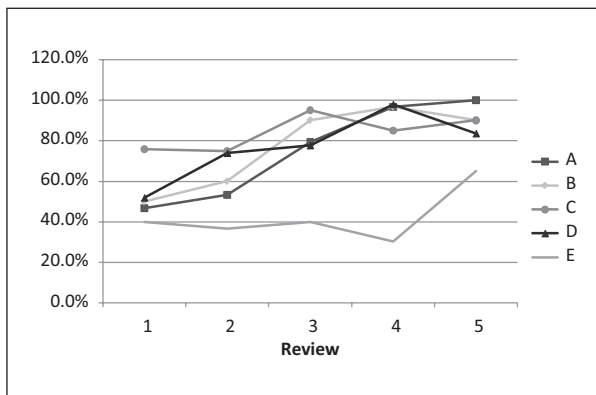


Figure 2. Counseling for nutrition improvement by site.

### Counseling for Nutrition and Physical Activity

On average, counseling for both nutrition and physical activity were initially documented as 52% and 39% of visits, respectively. Nutrition counseling increased to 87%, and physical activity counseling reached 77% (Table 1).

There was more variation in performance among the sites on these measures than for BMI percentile, but 4 of 5 sites demonstrated a consistent pattern of improvement (Figures 2 and 3). None of the sites demonstrated significant improvements between first and second reviews. Three sites showed improvements in one or both measures at the third review, whereas 2 sites had significant improvements by the fourth review. All but 1 site accomplished significant improvement overall (Table 1). Site E had significant improvement in counseling for nutrition between reviews 4 and 5 but not significant improvement overall.

Site D lost ground in counseling for nutrition between reviews 4 and 5 but still had significant improvement overall. Site C did not demonstrate significant overall improvement in counseling for nutrition, having started at 76% and finished at 90%. At this site, overall improvement was demonstrated for counseling for physical activity even though they finished at only 73%.

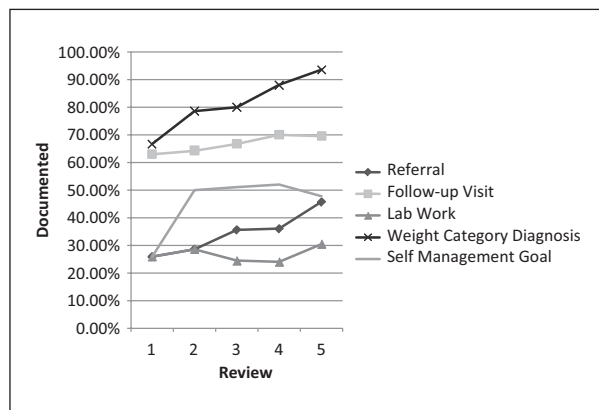
### Measures for High-Risk Patients

When providers identify POW based on BMI percentile, this leads to a set of best practices, including specific weight category diagnosis, the development and use of patient/parent self-management goals, and further medical management via appropriate lab tests, referrals, and follow-up visits. Among the 5 practices in the 2011 POWQII, an average of 27.6% (210 of 761) of the patients whose records were reviewed were found to be overweight or obese (BMI  $\geq$  85th percentile).

These 210 patients represent those considered “high risk” and become the denominator for the assessment of the remaining measures of quality (see Table 2). This smaller number of patient records limits our examination to the 5 sites as a group. Best practices would call for 100% of 210 patients to receive weight category diagnosis and help in setting self-management goals (Figure 4). For referrals, follow-up visits, and laboratory orders, the expectation varies with the needs of the patient and may not reach 100% (Figure 4).

### Weight Category Diagnosis

Diagnosis classifies all high-risk patients into either obese ( $\geq$ 95%) or overweight ( $\geq$ 85% through 94%) groups. This diagnosis for each high-risk patient



**Figure 4.** Best practices improvement for high-risk patients.

improved over the course of the POWQII (67% to 94%), but not between sequential reviews (see Table 2).

### Self-Management Goals

Assisting patients in setting self-management goals regarding diet and physical activity is an appropriate practice for all high-risk patients. Providers averaged only 26% at first review but increased to 48% by the final review; however, this change was not statistically significant.

### Referrals

At first review, these providers were referring 26% of their high-risk patients. This increased to 46% over the course of the QI. Although we do not know what percentage of patients should be referred or whether the increased rate shown here is adequate, this suggests that QI can improve this practice. Overall improvement was not statistically significant.

### Follow-up Visits

Providers were scheduling follow-up visits for 63% of patients at first review, and this increased to approximately 70% by the final review. Like referrals, the emphasis on follow-up visits in the POWQII resulted in a small apparent increase in this practice, but this was not statistically significant.

### Laboratory Work Ordered

Lab work depends on individual patient needs. By the final review, lab work orders had increased from 26% at baseline to 30%, but this improvement was not statistically significant.

## Discussion

Providers in the POWQII were able to quickly improve assessment of BMI percentile for their patients. Initially, their practices were consistent with the literature showing that BMI percentile tracking is not a routine component of primary care delivery.<sup>7</sup> One site improved from 0% to 100% following the first intervention. Another site tripled its rate of documented BMI percentile from 30% to 85% by second review and 95% at the third.

Counseling for nutrition and physical activity did not improve as much or as rapidly as BMI percentile assessment. This may have been the result of an early emphasis on BMI percentile in the POWQII and/or provider perspectives. Determining a BMI percentile may be considered more of a procedural and automatic component of the patient intake process, whereas counseling for nutrition and physical activity may have more variation based on clinical judgment and/or individual visit priorities.

Rates for weight category diagnosis and counseling for physical activity and nutrition among high-risk patients also improved to better than 90% by the end of the program. Most of the improvements occurred in the first 2 reviews after baseline, with subsequent reviews providing evidence that improvements were sustained over the 9 months of the program. These measures, along with BMI percentile, constitute the recently established HEDIS criteria for POW care.<sup>17</sup>

Self-management goals were documented for only about half of the cases reviewed, following an initial increase above an average baseline of 26%. We are unsure why self-management goals lagged behind. Perhaps documentation of this practice is not clearly supported by medical record formats, paper or electronic. Patient development of self-management goals may depend on a provider's style of care delivery; for example, it may be more likely to occur among providers who used MI techniques but may have been less of a priority for other providers.

Referrals, scheduling of follow-up visits, and lab work also improved slightly. However, what constitutes proficiency in these practices is not easy to define because not all patients may need these services at any given visit. Guidelines acknowledge that follow-up protocol is individualized to the patient and family and attempt to outline recommendations with specific time frames.<sup>9</sup> Follow-up structure continues to be complex and will improve with increased attention in QI initiatives. Data on referrals and lab work were defined in terms of the current visit and may not reflect what was done in prior visits. Further clarification in concept and measurement of these indicators will strengthen future efforts at QI.

**Table 2.** Improvement for High-Risk Patients by Medical Record Review.

		Medical Record Reviews				
		1	2	3	4	5
Weight category diagnosis <sup>a</sup>	Documented	18	33	36	44	43
	Total records reviewed	27	42	45	50	46
	Percentage documented	66.7%	78.6%	80.0%	88.0%	93.5%
Self-management goal <sup>b</sup>	Documented	7	21	23	26	22
	Total records reviewed	27	42	45	50	46
	Percentage documented	25.9%	50.0%	51.1%	52.0%	47.8%
Referrals <sup>b</sup>	Documented	7	12	16	18	21
	Total records reviewed	27	42	45	50	46
	Percentage documented	25.9%	28.6%	35.6%	36.0%	45.7%
Follow-up visit scheduled <sup>b</sup>	Documented	17	27	30	35	32
	Total records reviewed	27	42	45	50	46
	Percentage documented	63.0%	64.3%	66.7%	70.0%	69.6%
Lab work ordered <sup>b</sup>	Documented	7	12	11	12	14
	Total records reviewed	27	42	45	50	46
	Percentage documented	25.9%	28.6%	24.4%	24.0%	30.4%

<sup>a</sup> $P \leq .01$ , baseline to final follow-up.

<sup>b</sup>Not significant across all intervals.

Practices had 12 months to complete the POWQII, with most finishing in 9 months, unable or unwilling to produce a sixth record review as planned. Two sites with fewer providers found it difficult to complete more than 20 record reviews at each round. Larger sites faced less of a burden per provider. With a sample of 30 records per round, we could expect to have data on fewer than 10 high-risk patients in each practice, limiting the statistical power of the data to guide improvements in individual practices. These challenges will continue to affect the conduct of QI work until electronic records and associated patient registries become commonplace. In addition, participants seemed to understand the use of PDSAs, and PDSAs were anecdotally incorporated in the QI process, but we were unsuccessful in tracking and quantifying them in relation to the regularly reported data measures.

The potential impact of this relatively simple QI intervention could be extended to the larger population of patients, with twice as many receiving appropriate screening for POW, and increasing other best practices shown to improve ongoing care and patient outcomes.<sup>9</sup> In addition, this initiative increased providers' exposure to clinical guidelines, which may reinforce appropriate application.<sup>7</sup> Consistent use of weight category diagnosis may be reinforced by the availability of additional reimbursement to the practice. Management of a high-risk population begins with consistent identification of risk in members of the population. Although much of delivering patient care is individualized, managing

patients as a population is instrumental in creating systems change that will improve health care delivery overall.<sup>18</sup>

Much has been said about why new practices are slow to be adopted.<sup>19</sup> The easy availability of QI data combined with a simple educational intervention should enable widespread improvements at relatively low costs. Better patient outcomes can be expected to follow.<sup>14,15</sup> We worked with pediatric practices not yet using an electronic medical record that supported QI data needs, which required a compromise between statistical rigor and the burden of manual medical record reviews. Some sites had difficulty meeting data targets, in terms of number of records in each sample and the total number of samples reviewed.

QI initiatives such as ours should be greatly facilitated as practices come to use electronic health records, especially those with patient registry functions. This will mean an end to manual record reviews and the need to estimate performance from small samples; all patients who fit the protocol can be used for assessment of best practices. It is important to note that these changes will put the production of improvement data into the background where it belongs and shift the focus to integrating performance data into the QI process, where change is initiated.

In addition to the 5 general pediatric practices participating in the 2010-2011 POWQII, we conducted a pilot study with 1 pediatric endocrinology practice. Our interest was in expanding the scope of the program



to fit the circumstances of other types of practices. The endocrinology site, with a single provider, completed 153 record reviews over 5 rounds, and the pattern of improvements were similar to those of the general pediatric practices. This practice was screening for BMI percentile at a rate of only 20% but improved to 98% by the second review. This suggests that the POWQII model may be relevant to subspecialty providers and that the quality of care can be enhanced by participation.

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### Authors' Note

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