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SUPPLEMENT ARTICLE

School-Based Health Centers and Obesity Prevention: Changing Practice Through Quality Improvement

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ABSTRACT

OBJECTIVE. To examine whether a quality improvement initiative aimed at medical providers in school-based health centers would improve the recognition and management of pediatric obesity.

PARTICIPANTS AND METHODS. Thirteen school-based health centers, with a total of 22 providers and 6 clinical staff, were enrolled in the study. Quality improvement measures and best medical practices for assessing and treating pediatric obesity were provided during 1 learning collaborative and 2 on-site trainings. Measures included documentation of (1) a BMI percentile, (2) a corresponding weight-category diagnosis, (3) assessing readiness to change, (4) assessing readiness to change for patients with a BMI at ≥85th percentile, and (5) addressing 4 key messages that enhance a healthy lifestyle.

RESULTS. Results of paired-sample t tests indicate that all 5 variables significantly increased from baseline to the midpoint data collection. From midpoint to the final data collection, documentation of BMI percentile and key messages increased, although not significantly. Documentation of weight-category diagnosis and readiness to change for patients with a BMI at ≥85th percentile decreased significantly, whereas documentation of readiness to change decreased, but not significantly.

CONCLUSIONS. This study offers promising evidence that school-based health center providers trained in a quality improvement initiative demonstrate consistent improvement in implementing the guidelines for treatment of pediatric overweight. *Pediatrics* 2009;123:S267–S271

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Key Words
overweight, obesity, quality improvement, school-based health center

Abbreviations
SBHC—school-based health center
QI—quality improvement
WCC—well-child check
LC—learning collaborative
MI—motivational interviewing
PDSA—plan-do-study-act

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OBESITY RATES FOR children and youth in New Mexico are rising, as they are in the country as a whole.[1] The impact is disproportionate, however, with American Indian and Hispanic youth having much higher rates of overweight and obesity than their white counterparts. The 2005 Youth Risk and Resiliency Survey for New Mexico revealed that although 19% of white youth are overweight or obese, 29% of Hispanic youth and 38% of American Indian youth are overweight or obese.[1]

In response to the problem of obesity in children and youth, the governor of New Mexico, Bill Richardson, doubled the number of school-based health centers (SBHCs), creating at least 1 in every county (a total of 68 state-funded SBHCs). During the 2007 fiscal year, SBHCs in New Mexico provided care to ~35 400 children and adolescents.[2] An SBHC is a clinic based on school property that provides care to students during the school day. The model of health care is different from that of a typical physician's office or urgent care center. The team that provides care consists of both a medical provider and a mental/behavioral health provider and may include a health educator, nutritionist, and others. The medical provider is typically a nurse practitioner or physician's assistant. At the initial visit, each student is asked to fill out a comprehensive health assessment that includes questions about all of the major risk categories including nutrition, physical activity, home situation, risk for suicide and depression, pregnancy, and substance abuse. SBHCs are changing how school-aged children receive health care by focusing on prevention, early intervention, and access to care.

Primary care providers have few tools for confronting the epidemic of obesity and are often hampered by a lack of knowledge, skills, and tools for dealing with their overweight and obese patients.[3] Many medical providers have never received specific training in counseling patients about obesity, diet, and exercise and are unfamiliar with recent national guidelines for obesity prevention that recommend a number of interventions including tracking BMI on the Centers for Disease Control and Prevention BMI percentile charts that are specific for both age and gender.[4]

Envision New Mexico is a quality improvement (QI) program at the University of New Mexico, within the Department of Pediatrics. Since 2004, Envision New Mexico has worked with primary care medical providers throughout New Mexico to help them more effectively address pediatric overweight and obesity. To date, more than

450 medical providers and 350 clinical staff members across the state have been trained by Envision New Mexico in pediatric obesity diagnosis and management. This article summarizes findings from September 2004 to May 2005, the first year of an Envision New Mexico pediatric obesity QI initiative that worked with medical providers at SBHCs. The objective was to examine whether a QI initiative aimed at medical providers in SBHCs would improve the recognition and management of pediatric obesity. Although patient outcomes were beyond the scope of this study, Envision New Mexico is currently involved in research to examine effects of QI on patient outcomes.

METHODS

Study Sites and Population

Potential SBHCs were recruited by "cold" calls, word of mouth, and those who expressed an interest in participating. These centers are located in elementary, middle, and high schools and offer free primary and behavioral health care services including immunizations, sports physicals, well-child checks (WCCs), reproductive health services, and screenings for substance abuse and mental health disorders.

Envision New Mexico enrolled a total of 13 SBHCs. The race/ethnicity breakdown for the school-aged children attending public schools was 1.35% Asian/Pacific Islander, 2.61% black, 29.54% white, 55.53% Hispanic, and 10.97% Native American.[5] The following characteristics were associated with the participating SBHCs: (1) location (11 urban and 2 rural); (2) grade level (one kindergarten through 5th grade, two 6th through 8th grades, and ten 9th through 12th grades); and (3) percentage of students receiving free/reduced lunch (mean: 70.4; SD: 17.0; minimum: 43; maximum: 94). Although many of these SBHCs are in urban communities, it is important to understand that the isolation of these centers, small population, and distance to large health care facilities is similar that of rural communities.

Sites for this QI initiative were selected for participation on the basis of the following factors: expressed interest from at least 1 provider at the site; geographic location (a statewide distribution of sites was sought); and infrastructure of the site (the ability of each prospective site to undertake a project such as this; staff and provider time was assessed by Envision New Mexico).

For the purposes of this study, provider behavior was being examined; thus, the providers were the participants. A total of 22 providers and 6 clinical staff were trained. "Providers" included physicians, nurse practitioners, registered nurses, physician assistants, psychiatrists, clinical psychologists, licensed therapists, licensed social workers, and registered dieticians. "Clinical staff" included medical assistants and licensed practical nurses.

Training/Intervention

During a 1-day learning collaborative (LC) in fall 2006, providers and clinic staff from participating sites were introduced to Envision New Mexico, the goals for the pilot project, the model for improvement, the plan-do-study-act (PDSA) cycle, data being collected for the project, and motivational interviewing (MI). This LC also provided a unique opportunity for participants to collaborate with, and learn about, the other SBHCs and communities they serve.

The model for improvement applies the PDSA cycle of change, a widely used framework for improving systems of care.[6] By repeating the cyclic process for change and performing their own self-assessments, participants develop QI skills, self-assessment methods, and capacity for sustainable change in practice that are transferable to future specific clinical and practice management topics. For the purposes of this study, participants were encouraged to use the PDSA cycle to operationalize implementation of the QI project within the practice.

Two on-site trainings occurred after the LC. Training 1 was a 1½-hour training that included the epidemiology of pediatric overweight and best medical practices for the diagnosis, treatment, and management of pediatric overweight (which includes proper chart documentation). During this training, providers were instructed on data documentation and collection. On the basis of national guidelines for best medical practices of pediatric overweight,[3,4,7,8] participants were instructed to document 4 variables (BMI percentile, weight-category diagnosis, readiness to change, and 4 key messages). Implementation and documentation of these steps was to take place at all WCCs and sports physicals for children between the ages of 2 and 18 years. All sites were provided with orange data stickers that were to be placed in the chart for data collection. Providers were instructed to complete each field of the data sticker at the time of the office visit. Data for this study were taken directly from the data stickers or from the chart if the stickers were not in place.

Training 2 was a 1½-hour on-site training on MI. The providers participated in a brief didactic training on the foundation and skills of MI as well as role plays. Specifically, providers were trained in 4 steps including (1) using open-ended questions to open the visit, (2) using affirmations, (3) reflective listening, and (4) summarizing the visit and next steps.

Quality Indicators

Variables

Best medical practices for diagnosing, treating, and managing pediatric overweight include the calculation of a BMI percentile, making a weight-category diagnosis on the basis of the BMI percentile, assessing one's readiness to change and engaging in MI dialogue, and discussing 4 key messages that enhance a healthy lifestyle.[3,4,7,8]

A BMI percentile is defined as a standardized calculation of BMI that takes both age and gender into account.[9] The percentile also demonstrates how a child compares to the reference population of thousands of children.[9] Definitions of weight categories are (1) obese, BMI $\geq$ 95th percentile, (2) overweight, BMI = 85th to $<$95th percentile, (3) healthy weight, BMI = 5th to $<$85th percentile, and (4) underweight, BMI $<$ 5th percentile.[9] MI is "a client-centered, directive method for

TABLE 1 Percentage of Chart Documentation and SDs of Dependent Variables According to Time

Time	*N*	BMI Percentile		Weight Category Diagnosis		Readiness to Change		Readiness to Change if BMI ≥85%		Key Messages	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Baseline	13	0.09	0.16	0.09	0.13	0.00	0.00	0.00	0.00	0.16	0.25
Midpoint	12	0.79	0.18	0.70	0.26	0.32	0.29	0.62	0.35	0.60	0.36
Final	9	0.79	0.30	0.46	0.30	0.17	0.13	0.45	0.33	0.71	0.33

enhancing intrinsic motivation to change by exploring and resolving ambivalence."[10,11] Assessing readiness to change (for any given behavior) is appropriate to discuss with all patients; however, for the purposes of this study, it was most relevant for patients with a BMI at ≥85th percentile. Thus, providers were instructed to assess readiness to change with all patients with a BMI at ≥85th percentile (those who were overweight or obese). The 4 key messages included (1) eating 5 servings of fruits and vegetables daily, (2) decreasing screen time (television, computers, and video games), (3) decreasing sugared-beverage intake (and increasing water intake), and (4) increasing daily physical activity levels.[3,4,7]

Chart Audits and Data Collection

Medical chart reviews of WCCs and sports physical visits were conducted 3 times at each participating site: before the QI initiative (baseline), after completing both on-site trainings (midpoint), and at study completion (final). These audits were scheduled at ~3-month intervals. Envision New Mexico staff members conducted the chart audits, and all staff members were trained to collect data in the same manner. At each audit, WCCs and sports physical visits for patients between the ages of 2 and 18 years were reviewed for the presence or absence of 4 variables: documentation of a calculated BMI percentile; documentation of a corresponding weight-category diagnosis; documentation of the patient's readiness to change; and documentation of communication of the 4 key messages (drink more water/fewer sugared beverages, decrease screen time, play hard, and eat more fruits and vegetables). The 4 variables were treated by using a discrete category of yes (present) or no (absent).

Participating sites were instructed to sample 30 charts for each audit. For the baseline audits, sites were instructed to sample 30 medical charts with WCCs and/or sports physical visits with dates before any Envision New Mexico training. For the midpoint and final chart audits, sites were instructed to sample 30 WCCs and/or sports physical visits between specific dates. Midpoint chart audits were selected from visits that occurred after trainings 1 and 2. Final data collection occurred near the end of the project year and before SBHCs' closing for the summer. Final chart audits were selected from visits that occurred after midpoint data collection to the end of study. During the audits, Envision New Mexico staff looked for the orange data stickers placed in the charts. If the auditor did not find the orange data sticker, the most recent WCC or sports physical form in the medical chart was consulted for the data. An Envision New Mexico staff member participated in all of the on-site chart audits.

Data Analyses

The unit of analysis for these data analyses is the clinic sites (SBHCs). At baseline there were a total of 13 SBHCs; at midpoint there were a total of 12 SBHCs; and at the final point there were a total of 9 SBHCs. A total of 800 charts were reviewed throughout the project year. For all sites that participated in data collection, the average number of charts reviewed at baseline was 28.31 (SD: 2.87), at midpoint was 21 (SD: 9.65), and at the final point was 20 (SD: 9.76). For each site, the percentage of charts of those audited that documented the 4 dependent variables was calculated. In addition, a fifth dependent variable—readiness to change—was calculated only for those charts with a documented BMI at ≥85th percentile. This measure is more precise, because readiness to change is most appropriate for those in the overweight and obese weight categories.

The data were analyzed by using 10 separate paired-sample *t* tests (from baseline to midpoint and from midpoint to final for each of the dependent variables). The 5 dependent variables were documentation of (1) BMI percentile, (2) corresponding weight-category diagnosis, (3) readiness to change, (4) readiness to change with patients who had a BMI at ≥85th percentile, and (5) key messages. The University of New Mexico Human Research Review Board approved this study protocol.

RESULTS

The means in the text may not match the means in Table 1 because only sites that had data from all 3 time periods are included in the analysis. Figure 1 displays the change in means for all 5 variables in graphic form. From baseline to midpoint, all 5 variables significantly increased: (1) documentation of BMI percentile ($t_{11} = 12.86$; $P < .001$ [baseline mean: 0.05; SD: 0.06]); (2) documentation of weight-category diagnosis ($t_{10} = 7.58$; $P < .001$ [baseline mean: 0.07; SD: 0.09]); (3) documentation of readiness to change ($t_{11} = 3.87$; $P < .005$); (4) documentation of readiness to change for patients with a BMI at ≥85th percentile ($t_{10} = 5.89$; $P < .001$); and (5) documentation of key messages ($t_{11} = 4.17$; $P = .001$ [baseline mean: 0.14; SD: 0.24]).

The changes from midpoint to final varied. Two variables increased, but neither was significant: (1) documentation of BMI percentile ($t_8 = 0.26$; $P = .405$ [midpoint mean: 0.76; SD: 0.19]); and (2) documentation of

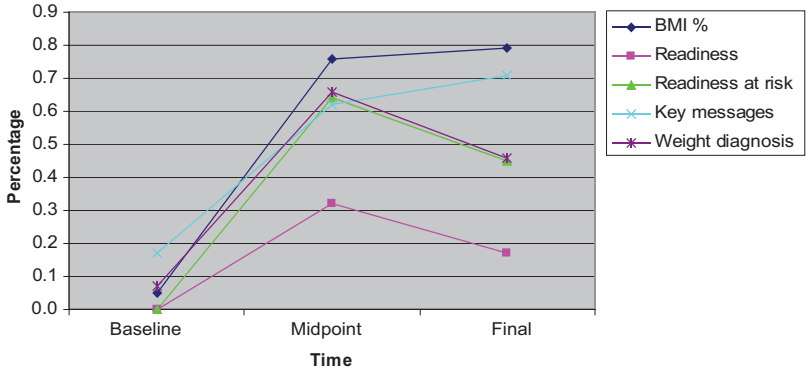

FIGURE 1
Percentage of charts with documentation of dependent variables at baseline, midpoint, and final data collection.

key messages ($t_8 = 1.69$; $P = .065$ [midpoint mean: 0.62; SD: 0.34]). Three variables decreased from midpoint to final, with 2 being significant: (1) documentation of weight-category diagnosis ($t_7 = 1.99$; $P < .05$ [midpoint mean: 0.66; SD: 0.28]); (2) documentation of readiness to change ($t_8 = 1.64$; $P = .07$ [midpoint mean: 0.30; SD: 0.23]); and (3) documentation of readiness to change for patients with a BMI at ≥85th percentile ($t_8 = 2.49$; $P < .05$ [midpoint mean: 0.64, SD: 0.32]).

DISCUSSION

In this study we examined a QI initiative aimed at improving SBHC medical practices associated with pediatric overweight. Results from the paired-sample *t* tests on all 5 variables indicated statistically significant improvement for each of the variables from baseline to the midpoint. However, 2 variables had significant decreases from the midpoint to final data collection: documentation of weight-category diagnosis and documentation of readiness to change for patients with a BMI at ≥85th percentile. The other 3 variables did not have significant changes from the midpoint to final data collection, but documentation of readiness to change decreased, whereas documentation of BMI percentile and key messages increased.

The results of these analyses indicate that the QI training offered to providers in SBHCs was effective in changing provider behaviors in treating pediatric overweight. Documentation of BMI percentile, a corresponding weight-category diagnosis, assessing readiness to change (and, more specifically, assessing readiness to change for patients with a BMI at ≥85th percentile), and key messages did not occur before the trainings. Each of these 5 variables had a statistically significant increase after the trainings were offered.

Although these 5 variables significantly improved from baseline to the midpoint, some variables were sustained better than others. Documentation of BMI percentile and key messages continued to increase over time for providers (although not significantly). Possible explanations for the linear trends with BMI percentile and key messages are that these 2 variables make most sense to providers who are treating an overweight patient and may also be the easiest variables to change. BMI percentiles can be documented by the medical assistant while the vital signs are being documented, and key messages can be mentioned quickly and easily in the anticipatory guidance phase of a visit.

There are 4 potential explanations for the decrease seen in readiness to change and weight-category diagnosis. First, these 2 variables may not be as easy for providers to implement into practice. When providers are pressed for time, taking the time to document a weight-category diagnosis and asking a patient about his or her readiness to change takes time. Moreover, if providers do not feel that these changes in behaviors are meaningful to the treatment and outcome of the visit (especially when pressed for time), they may be less likely to routinely implement them.

Assessing readiness to change and using MI are crucial steps that a provider can take to elicit behavior change and engage patients in behavior-change dialogue.[3,4,7,8,10–12] The central purpose of MI is to explore and resolve ambivalence, with the intentional guidance of the provider to pursue this goal.[10,11] By allowing the patient to explore and articulate ambivalence, MI increases one's intrinsic motivation to change and decreases resistance to change.[10,11] Thus, to see improvements in behavior change, providers and patients would seem to benefit from an increase in the use of MI in this setting.

Second, the timing of the trainings may be a factor. The trainings in medical management and MI were both conducted after the baseline data-collection point and before the midpoint data collection. As expected, providers applied the new information into their practices after the trainings and perhaps lost momentum midway through the study year. Such decreases are consistently found with trainings and suggest that booster-training sessions after the midpoint are warranted.[13,14]

Third, the loss of momentum around the midpoint may be a result of the nature of the patient visits. During the fall and winter, visits often result in an increase in acute-care medical visits as opposed to well-child visits. These acute-care visits result in limited time to address medical themes not related to the acute-care visit. In addition, maintaining behavior change is difficult when medical practices are busy, and providers fall back into familiar behavior patterns to manage the work load.

Fourth, SBHCs experienced staff and provider turnover throughout the project year. Some SBHCs depended on either the clinic staff or the provider to im-

plement the project, whereas other SBHCs shared the responsibility between the positions. In the clinics that shared responsibility and experienced staff and/or provider turnover, some patients may have been given "partial" intervention. For example, a clinic staff member may have calculated the BMI percentile while expecting the provider to document a weight-category diagnosis and assess readiness to change. Thus, staff and/or provider turnover likely had an impact on the extent to which the intervention was implemented.

Implications of Results

The results of this study offer several implications for future research and medical practice. SBHCs may offer a key setting for implementing QI initiatives for overweight pediatric patients. Because of the unique setting and clinical structure, providers within SBHCs are able to offer a variety of medical services while youth are at school and may provide a venue of improved treatment for pediatric overweight.

The results of this study offer encouraging evidence for QI initiatives for the best medical practices of pediatric overweight. Providers were able to significantly change practice after a short intervention (a few hours of training) and maintain some of the change. QI programs are effective in facilitating change because they offer systematic, concrete methodologies for changing behaviors and medical practices. QI-program measures can be used to assist a medical practice "understand its own care processes, understand how its performance compares with others, and track measures in response to changes."[15] In the scope of this study, these systematic methodologies for implementing practice change were especially useful in addressing the complexity of treating and managing pediatric overweight and comorbidities. After the initial trainings, providers were able to implement feasible changes (ie, best-practice guidelines such as documenting a BMI percentile) into practice and, thus, ultimately provide improved detection, better care, and potentially increased health outcomes for overweight patients.

Limitations

The SBHCs were not selected randomly (sites were selected on the basis of interest shown to participate in the QI initiative). In addition, the numbers for the chart reviews at the midpoint and final data-collection point were highly variable. The goal was to audit 30 charts at each data-collection point, yet that number was not attainable for some sites for several reasons (lack of WCCs and sport physical visits, increase of acute-care office visits, lack of provider participation [often caused by turnover], and difficulties with behavior change [ie, changing the way one practices medicine]).

CONCLUSIONS

The purpose of this study was to examine a QI initiative aimed at improving medical practices associated with pediatric overweight. This study offers promising evidence that providers trained in a QI initiative demonstrate consistent improvement in implementing the guidelines for treatment of pediatric overweight. In addition, SBHCs responded positively to the QI trainings and are successful in implementing the changes.

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