

Sustainability of Key Maine Youth Overweight Collaborative Improvements: A Follow-Up Study

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Abstract

Background: Primary care is an opportune setting to contribute to obesity prevention and treatment. However, there is limited evidence for effective and sustainable interventions in primary care. The Maine Youth Overweight Collaborative (MYOC) successfully affected office systems, provider behavior, and patient experience. The current study evaluates the effect of MYOC on provider knowledge, beliefs, practices, patient experience, and office systems, in 2012, three years postintervention.

Methods: A quasi-experimental field trial was used with all seven original MYOC intervention sites that participated in MYOC between 2004 and 2009 and two non-MYOC control sites. Data from immediately post-MYOC in 2009 served as the baseline comparison. Main outcome measures included rates of recording of BMI percentile in chart, weight classification, use of the 5210 behavioral screening tool, parental reports of counseling received on 5210 topics, and clinician reports of changes in knowledge, beliefs, and practices.

Results: Many key MYOC improvements were sustained or improved 3 years postintervention and demonstrated improvements, as compared to control sites.

Conclusion: In an environment where obesity has become a priority for healthcare providers and systems, we demonstrate sustainable improvements in clinical decision support and family management of risk behaviors within a primary-care-based approach to addressing overweight risk among children and youth. Some declines were observed for more-complex behavioral and system outcomes. Many opportunities for office system and provider improvements remain.

Introduction

The prevalence of childhood obesity has more than doubled in children and quadrupled in adolescents in the past 30 years¹ and currently affects at least 17% of children and adolescents,¹ with even higher rates among subpopulations of minority, economically disadvantaged,^{2,3} and rural children.⁴ More-recent data indicate that obesity prevalence may be “leveling off.”⁵ Overall, obesity prevalence is still much too high and is associated with significant health problems among children and adolescents and is an important early risk factor for much of adult morbidity and mortality.⁶

The increase in the prevalence of childhood and adolescent obesity portends an increase in associated chronic disease and calls for intervention strategies that are broad based, including multiple sectors of society.⁷⁻⁹ One important focus for intervention is the primary healthcare setting, where providers already see most children and youth in the United States. This setting may be opportune for creating awareness and motivating change to reduce risk for obesity. Current gaps in both care and provider attitudes highlight the opportunities that exist in this area.¹⁰ Providers are not widely calculating BMI percentiles for children, are not delivering preventive behavioral messages, nor are they providing appropriate medical evaluation for obese children.¹¹ There is

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also a documented lack of provider confidence (or self-efficacy) for addressing obesity in children, as well as addressing lifestyle issues with children and their families.^{11–16} There is very limited evidence for effective clinical interventions to prevent or treat obesity in primary care settings or to routinely deliver preventive messages related to healthy nutrition and physical activity.^{8,11,17} In addition, a majority of state Medicaid and private insurance plans have been slow to reimburse primary care visits to address obesity, contributing to a lack of resources to address the issue. Primary care interventions represent an important avenue for obesity prevention and treatment as part of a multi-sector approach in communities.

The Maine Youth Overweight Collaborative (MYOC) is a primary-care-based intervention implemented from 2004 to 2009 over three phases (52 months) and targeted youth, ages 2–18 years, and their families. Phase 1 began in November 2004 and ended in November 2006. Phase 2 began in November 2006 and ended in May 2008. Phase 3 began in May 2008 and ended in May 2009. The intervention took place in 36 sites in both urban and rural areas of Maine. Intervention materials were based on the conceptual framework of the Chronic Care Model derived from the Institute for Healthcare Improvement's Breakthrough Series Collaborative model.^{18–21} Key components of the MYOC intervention included (1) approximately one 1.5-day learning session (for the practice team to attend) every 6 months, (2) 4–6 minutes during each well-child visit for the healthcare provider to deliver the 5210 healthy habits message (5 servings or more of fruit and vegetables, 2 hours or less of screen time, 1 hour or more of physical activity, and 0 sugar-sweetened beverages) to promote self-management skills and set goals, (3) 5 minutes during each well-child visit for another practice team member (*e.g.*, medical assistant or nurse) to measure height and weight for BMI, (4) two 30-minute meetings per month to assess team progress and discuss partnerships with community and state organizations, (5) one to two 1-hour conference calls per month, and (6) a 1-hour site visit every few months. The MYOC intervention improved clinical office systems, provider knowledge, attitudes, skills, and practices, and patient experiences.²² This study focuses on evidence for sustained improvements nearly 3 years after the conclusion of the MYOC intervention. For more information on the MYOC intervention and tools, see the Harvard School of Public Health Prevention Research Center website.²³

Methods

Design

The design of this evaluation was quasi-experimental,²⁴ with seven intervention and two control sites; sites were not randomized to intervention condition. The seven intervention sites were the only sites to have completed all three phases of the intervention between 2004 and 2009 and were recruited and participated in 2012. The two 2012 non-MYOC control sites reported no participation in childhood-

obesity-related initiatives. The study design compares serial cross-sectional surveys and chart reviews at two time points (see Table 1). Individuals were not tracked over time.

The seven MYOC sites and the two control sites appear similar on a number of characteristics. Control sites had not participated in specific childhood obesity improvement efforts either preceding or since MYOC. Intervention sites reported an average of 4.7 providers and 4600 patients, whereas control sites reported an average of 2.5 providers and 3600 patients; the average percentage of patients with MaineCare (Maine's version of Medicaid) was 45% in intervention and 45% in the control sites. All intervention and control sites reported using an electronic medical record (EMR). A \$500 incentive was provided to each participating site.

Postintervention data were collected during a 2-month period in February–March 2012. Data included chart reviews, patient surveys, and an online provider survey. Surveys and chart review forms as well as data collection protocols from the original MYOC study in 2009 were used for post-data collection. Practice managers were mailed a package of data collection forms and instructions in January 2012. Practices were asked to begin data collection in early February and complete all data collection efforts by the end of the month. Practices were instructed to distribute the parent survey to the next 30 parents or caretakers of patients ages 2–18 years who came in for a well-child visit. Surveys were to be handed out only once and mailed back, whether completed or not, to allow for the calculation of response rates. Practice managers were asked to complete as close to 50 chart reviews as possible of practice patients ages 2–18 as long as there was an equal number of charts per practice provider (nurse practitioner, physician assistant, MD, or DO). In other words, if a practice employed two providers, we expected 25 chart reviews per provider. If a practice employed four, we expected 12 per provider or a total of 48 for that practice. We also asked practice managers to distribute a link to our provider survey (through SurveyMonkey) to each provider employed by the practice for completion before the end of February 2012. Data collected in 2009 using the same instruments and protocols²² served as baseline data for the intervention sites.

Data

The study was found exempt from full review and oversight by the Committee on Human Subjects at the University of New England (Portland, ME) and utilized a short paragraph describing the voluntary nature of data collection, which was included at the beginning of each data collection instrument.

Chart review. Data collected from charts included birth date, gender, name of provider, and date of examination (coded in year/month), weight, and height. In addition, data were collected about BMI tracking and BMI percentile calculation, weight classification, and blood pressure assessment. Whether a 5210 lifestyle survey (a short

Table 1. Data Collected and Used for Current Analysis

Data source	Variable	Results 2009 7 intervention sites	Results 2012 7 intervention sites	Results 2012 2 control sites
Chart reviews	N	295	322	100
	N, Gender	291	310	97
	% female	46	43.2	49.5
	Mean age (SD)	8.69 (5.00)	8.65 (4.78)	6.74 (4.52)
	N, age	286	315	97
	Age 0–2	10.1%	9.2%	16.5%
	Age 3–5	23.8%	22.5%	26.8%
	Age 6–11	31.8%	39.1%	41.2%
	Age 12–18	34.3%	29.1%	15.5%
Parent surveys	N	223	194	60
	N, age	198	180	57
	Age 0–2	30.8%	28.9%	28.1%
	Age 3–5	19.2%	18.9%	35.1%
	Age 6–11	29.7%	31.7%	28.1%
	Age 12–18	20.2%	20.6%	8.8%
Provider surveys	N	19	19	4 ^a

^aData not used in current study because of small numbers.
SD, standard deviation.

patient questionnaire assessing adherence to the 5210 recommendations) had been completed was also noted along with whether a goal was set and goal-setting category (*i.e.*, 521 or 0). The chart review included information about any follow-up visit regarding weight. Chart review data were abstracted by site personnel onto data forms. These were double entry coded.

Parent survey. The parent/caretaker survey (parent survey) consisted of four items to assess parents' awareness of having heard lifestyle messages around the 5210 theme from their child's provider or nurse in the office at the last well-child visit: "Did a doctor, nurse, or anyone talk with you about sugar-sweetened drinks at your child's last visit?" Follow-up questions included: "Did you and your child set a goal of no sugar-sweetened drinks for your child?" and "Did you and your child make any sugar-sweetened drink-related changes?" Similar questions asked about nutrition, physical activity, and television and other screen time. We have no data documenting the validity or reliability of these questions. These items were developed to be simple to use in clinical settings, and there were no reports from practices indicating that parents had difficulty answering the items.

Provider survey. An online provider survey consisting of 53 items was used to measure provider knowledge, attitudes, self-efficacy, and practices around key collaborative

change objectives, including measurement and tracking of height, weight, and BMI percentile calculation and overweight classification, behavioral goal setting around 5210 behaviors (5 servings of fruit and vegetables, 2 hours or less of screen time, 1 hour or more of physical activity, and 0 sugary beverages), brief motivational interviewing, and working with local community organizations to support patients. Survey respondents were asked how strongly they agreed or disagreed with statements on a Likert-type scale from 1 to 5.

Statistical Analysis

For associations between 2009 and 2012 chart review questions of interest and year, we used logistic regression models with intrasite correlation among dichotomous responses (yes/no). The response variable was the outcome question, and an indicator of the year was the explanatory variable. Robust standard errors accounting for within-site clustering were calculated for hypothesis testing and estimation. Similar models were run for the parent/caretaker surveys for associations between responses to questions of interest and year. Logistic regression was also used to test association between chart review questions in 2012 to intervention status (*i.e.*, intervention vs. control analyses). The response variable was the question of interest, and the explanatory variable was an indicator of whether the response came from an intervention site. All models used

Table 2. Chart Review Results: Intervention Site Comparison 2009–2012

	2009 intervention % yes	2012 intervention % yes	Odds ratio comparing 2012 to 2009	p value
Tracking of BMI percentile for age/gender	89.4 (n=293)	98.1 (n=318)	6.15	0.052
Weight classification	86.2 (n=254)	90.9 (n=320)	1.61	0.588
Blood pressure	92.6 (n=295)	90.4 (n=321)	0.75	0.576
5210 patient survey	84.5 (n=291)	72.6 (n=318)	0.486	0.334

robust standard errors that accounted for possible within-site clustering and were run in Stata 12 statistical software (StataCorp LP, College Station, TX).

Results

All parent survey and chart review data were mailed back to the University of New England by mid-March. However, because of low provider survey response rates, we left the provider survey open through the end of March, after sending several reminders to practices (see Table 1 for final survey and chart review response numbers). In 2012, 322 intervention chart reviews (100% response rate), and 100 control chart reviews (100% response rate) were returned, whereas 295 intervention chart reviews were returned in 2009 (100% response rate). In 2012, 194 intervention parent surveys (92% response rate) and 60 control parent surveys (100% response rate) were returned, whereas 223 intervention parent surveys were returned in 2009 (64% response rate). Nineteen intervention provider surveys (66% response rate), and four control provider surveys (67% response rate) were returned in 2012, whereas 19 provider surveys were returned in 2009 (61% response rate; Table 1).

Chart review analyses demonstrated a significant ($p \leq 0.05$) increase in the tracking of BMI percentile in the chart in 2012, compared to 2009 (89.4–98.1%). No significant differences were found in having recorded weight classification and blood pressure and having completed a 5210 lifestyle survey between 2009 and 2012 (Table 2). Comparison sites were significantly less likely to have

completed a lifestyle survey than intervention sites in 2012. Although not statistically significant, weight classification was found in 56% of comparison site charts and in 91% of intervention site charts in 2012 (Table 3).

Parent surveys demonstrated a significant decrease in having heard messages about nutrition (*e.g.*, promoting fruits and vegetables) from their providers (91.4% in 2009 to 76.4% in 2012), but no significant difference ($p = 0.094$) in having heard messages about sugar-sweetened drinks (a decrease from 81.3% in 2009 to 66.1% in 2012). There was no significant difference in parents having heard messages about television/screen time or physical activity/exercise between the two years (Table 4). Although there was a trend of parents having heard more lifestyle messages in intervention versus comparison sites in 2012, only physical activity messages were heard less often in comparison sites (57.5% compared to 76.7%), a marginally significant difference ($p = 0.054$; Table 5).

Although our numbers were small and we were not able to match responses with sites, the provider survey findings support both chart review and parent survey findings (percent who strongly agreed 2009 and 2012, respectively: “I know how to address nutrition with all my patients” 50% and 47%; physical activity 67% and 68%; sugar-sweetened beverages 68% and 68%), self-efficacy (“I am comfortable addressing weight with all my patients” 56% and 58%), and practices (“I address nutrition with my overweight patients” 78% and 78%; physical activity 78% and 78%; sugar-sweetened beverages 78% and 83%).

Behavioral goal setting, a key element of brief focused negotiation (39% strongly agreed with statements in 2009,

Table 3. Chart Review Results: 2012 Intervention Versus Control Sites

	2012 intervention % yes	2012 control % yes	Odds ratio comparing intervention to control	p value
Tracking of BMI percentile for age/gender	98.1 (n=318)	99 (n=99)	0.531	0.511
Weight classification	90.9 (n=320)	56 (n=100)	7.88	0.149
Blood pressure	90.4 (n=321)	94.3 (n=99)	0.568	0.511
5210 patient survey	72.6 (n=318)	28.9 (n=100)	6.54	0.007

Table 4. Parent Survey Results: Messages Heard by Parents During the Well-Child Visit at Intervention Sites^a

	2009 intervention % yes	2012 intervention % yes	Odds ratio comparing 2012 to 2009	p value
Number of surveys	223	188		
Nutrition	91.4 (n = 186)	76.4 (n = 123)	0.305	0.002
Television/screen time	74.7 (n = 182)	69.4 (n = 124)	0.765	0.458
Physical activity	84.3 (n = 185)	76.7 (n = 120)	0.611	0.378
Sugar-sweetened drinks	81.3 (n = 182)	66.1 (n = 112)	0.447	0.094

^aComparison of 2009–2012 results.

whereas 17% did in 2012) and the perception of the adequacy of community resources (41% in 2009 and 23% in 2012) may have decreased.

Discussion

These data indicate that key MYOC improvements observed in 2009 were sustained 3 years postintervention. Sustained office system improvements around routine weight classification and blood pressure monitoring and increased rates of tracking BMI percentiles for age and gender from chart reviews were observed. These improvements are perhaps supported through EMRs that have now become routine in almost all pediatric and family practices throughout Maine. In 2004, only approximately one third of the original MYOC sites reported using an EMR, whereas 100% of these same sites now do. A decline in the presence of a patient lifestyle survey in the chart is not surprising, given that MYOC supported the creation of these types of surveys providing templates for practices and supported their application within the office system either in the EMR or through office flow diagrams provided to support their adoption. Without this level of support, lifestyle surveys may have disappeared or become less routinely used. The use of the surveys, once institutionalized, as part of an EMR system, may be sustained over time.

Parent surveys indicated that patients were still hearing messages about nutrition, screen time, physical activity, and sugar-sweetened drinks. However, they heard fewer messages about nutrition and sugar-sweetened beverages at follow-up. It may be that providers are focusing on overweight patients and families more, given the number of things they are required to accomplish during the well-child visit. Messages heard by parents of overweight versus normal weight children were not differentiated in the current study. In addition, provider (or patient) behavior needs to be reinforced to become routine, and there may be less reinforcement for provider behavior postintervention. A similar or only slightly lower proportion of control site patients reported hearing 5210 messages underscoring the importance of the larger environment where messaging is now common in multiple community settings.

Provider survey results may support findings from the parent surveys and chart reviews. Reported provider knowledge, efficacy, and behaviors remained largely unchanged, but at significantly higher levels than found at baseline in 2004²² (e.g., at baseline in 2004, 64% of providers had correct knowledge of BMI percentile for overweight, 14% strongly agreed they were comfortable addressing weight with patients, and 21% strongly agreed they were tracking patients' BMI percentile for age and gender), with the exception of behavioral goal setting. These findings may indicate that providers' efforts to address obesity within intervention sites

Table 5. Parent Survey Results: Messages Heard by Parents During the Well-Child visit^a

	2012 intervention % yes	2012 control % yes	Odds ratio comparing intervention to control	p value
Number of surveys	188	60		
Nutrition	76.4 (n = 123)	80 (n = 40)	0.81	0.545
Television/screen time	69.4 (n = 124)	69.2 (n = 39)	1.01	0.991
Physical activity	76.7 (n = 120)	57.5 (n = 40)	2.43	0.054
Sugar-sweetened drinks	66.1 (n = 112)	56.8 (n = 37)	1.48	0.249

^aComparison of 2012 intervention and control sites.

continue to be supported. The perception of the adequacy of community resources available for patient lifestyle improvement also decreased. Behavioral goal setting was among the most complex improvements of MYOC requiring routine practice and support. Community resources and partnership with community organizations, such as the Healthy Maine Partnerships, were fostered during the MYOC intervention 2004–2009. During the last 3–4 years, under the current administration (beginning in January 2011), Maine experienced substantial cuts in funding and saw a decline in many related community services and resources, and this may have contributed, in part, to our findings.

Office system improvements, once institutionalized, may be expected to remain in place even after intervention, as has been noted with other collaborative efforts^{18–21} given a supportive healthcare system and other community-wide efforts that raise awareness and encourage provider action to address obesity. The same can be said for provider beliefs and practices regarding patient lifestyle. MYOC required provider teams to participate in learning sessions that provided training and practice opportunities for skills in motivational interviewing, clinical assessment, nutrition, and behavior change strategies, as well as office system supports for these types of provider improvements. As was observed over the three phases of MYOC, once MYOC providers began addressing obesity with their patients, comparatively little effort was needed to sustain it.²² Maine's major health systems supported MYOC efforts and helped disseminate aspects of the intervention throughout the state, whereas other innovative multi-sector initiatives, such as Maine's Healthy Maine Partnerships, and programs, such as Let's Go! (a program whose clinical component was originally based on MYOC), helped to disseminate the MYOC message to multiple settings and additional primary care practices statewide.

An important outcome of the MYOC intervention is the expansion of clinical childhood obesity prevention and treatment efforts throughout Maine and nationally. The idea for MYOC emanated from a discussion about the need to address childhood obesity in the primary care setting after a conference on the topic in September 2003. Funding for the initial phase of MYOC (2004–2006) was secured and intervention began in November 2004, with an initial 12 practices representing 53 providers and over 80,000 patients. A second phase of MYOC, begun in November 2006 and ending in May 2008, saw an additional 10 practices join MYOC. By the third phase of MYOC, begun in May 2008 and culminating in May of 2009, 37 practices and 235 providers had implemented MYOC, representing over 189,000 patients in Maine alone. Because of MYOC's broad base of participants and partners, key MYOC improvement activities were sustained postintervention through other organizations and efforts, such as Maine's Healthy Maine Partnerships and the Maine Chapter of the American Academy of Pediatrics (AAP). The intervention was also implemented in numerous other states with the technical assistance of MYOC staff. Through its statewide multi-sector efforts,²⁵ the Let's Go!

program expanded on the MYOC messages and improvements, engaging 133 of 321 practices caring for children statewide, or 41% of practices by 2013. MYOC has also been adopted and adapted by providers nationwide and was disseminated through the AAP, the National Cancer Institute RTIPs,²⁶ and elsewhere. It is commonplace to hear about the 5210 message through national forums and trainings from primary care providers around the country. The widespread reach of key MYOC messages and improvements 10 years after initiation of efforts demonstrates the value of broad partnerships and the importance of primary care organizational and system improvements. MaineHealth, the leading healthcare system in Maine, invested in disseminating MYOC messages to its primary care practices through Let's Go! beginning in 2010. In addition, the successful implementation and diffusion of MYOC may, in part, be predicated on its adherence to factors understood to be important for successful implementation of prevention programs. These factors include monitoring the implementation fidelity and dose of a program, employing a sound prevention delivery system or organizational structure to lead the implementation of the program, as well as program, provider, and community characteristics (*e.g.*, cross-sector collaboration) that facilitate implementation and diffusion.^{27–29} We closely monitored MYOC implementation fidelity and dose in participating sites between 2004 and 2009 through tracking logs to monitor attendance at learning sessions, site visits, conference call participation, chart reviews, and staff surveys. Let's Go! monitored implementation and provided incentives for practices to adapt key MYOC improvements post-2009. First, the Maine-Harvard Prevention Research Center and then Let's Go! provided sound organizational structures to lead implementation efforts. MYOC provided information and training to fill practice and system gaps identified by providers and office staff throughout the intervention, and MYOC providers, from the original cohort of seven, were themselves innovators in developing the MYOC approach to obesity prevention and treatment. Finally, the Healthy Maine Partnerships were key collaborators working in child care, school, after school, parks, grocery venues, YMCAs, and other community settings where consistent messages across ecological sectors were able to mutually reinforce behavior change.

Although a low dose intervention such as a yearly 4–6 minutes in a primary care setting may not, by itself, impact a child's growth trajectory,³⁰ changes within the primary care office setting, over time, can contribute to efforts in other community sectors to promote child health and decrease chronic disease.²⁰ In fact, through MYOC's data collection efforts, we were able to observe a flattening of children's growth trajectories in both MYOC intervention and nonintervention sites as early as 2006 (Gortmaker S, unpublished data, Harvard School of Public Health, 2009). These trends are consistent with data from the Maine Youth Risk Behavior Survey, which demonstrate consistent decreasing trends overall beginning in 2005.³¹ In comparison, trends in neighboring states Vermont and

New Hampshire, for example, continued to increase among high school students through 2009 and 2011, respectively.³¹

Even with many MYOC improvements sustained, there are still opportunities for practice improvement. Weight classification and lifestyle discussions with patients can be incorporated into routine practice through planning of patient flow and sequencing (e.g., having patients meet with a medical assistant to complete a lifestyle survey before the provider visit) and the inclusion of prompts and forms in electronic medical record systems. Providers need continued training and opportunities to practice complex skills, such as Brief Focused Negotiation and Behavioral Goal Setting, powerful tools to assist in patient behavior change.^{32–34} This can be accomplished through lunch time practice sessions, for example, or periodic off-site learning sessions. They also require resources in the community to support their patients' efforts once they leave their practices.

Key Limitations

Our study design was limited as a result of our convenience sampling and the cross-sectional nature of the data. We observed possible contamination of the intervention to control sites, as indicated by 28% of the sites reporting using a lifestyle survey. By 2012, many original MYOC recommendations had been disseminated by local and national partners (e.g., the AAP disseminated the MYOC flip chart through their website beginning in 2006). True control sites were a challenge to recruit, and including only two control sites limited the power of our analyses. Information on provider turnover at intervention sites was not collected nor did we assess how many of the providers who participated in the provider survey did so at both time points. Finally, no data indicating validity and reliability of the survey instruments were collected. There was no indication, however, that participants had any difficulty completing surveys.

Conclusion

In an environment where obesity has become a priority for healthcare providers and systems, the MYOC intervention demonstrates sustainable improvements in clinical decision support and office systems. Clinical improvements that began with MYOC have now reached 41% of practices caring for children within the state of Maine. There continue to be opportunities to improve provider skills to help them work with patients and office systems to address childhood overweight and obesity in the clinical setting.

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