SYSTEMS OF CARE AND QUALITY IMPROVEMENT: GUIDING THE CARE OF THE CHILD WITH OBESITY

Ihuoma Eneli, Gerri Cannon-Smith

- How can the system of care framework be applied to obesity prevention and treatment?
- What are the components of health care reform that are relevant to the child with obesity? How can the socioecological model and the Chronic Care Model (CCM) be applied to obesity treatment in pediatrics?
- What are the basic tenets of quality improvement (QI), and how can they be applied in improving obesity prevention and treatment?

This chapter will address the following American College of Graduate Medical Education competencies: systems-based practice and practice-based learning and improvement.

Systems-Based Practice: This chapter will help the pediatric health care provider understand systems level models of care and increase his or her awareness of the larger system of health care delivery that will improve their ability to interact with the system to optimize patient outcomes.

Practice-Based Learning and Improvement: This chapter will help the pediatric health care provider engage in ongoing QI in order to address childhood obesity and obesity-related comorbidities systematically in practice using advances in medical knowledge, epidemiology, and psychosocial and behavioral factors.
SYSTEMS OF CARE AND SUPPORTING MODELS

Systems of care is defined as a family-centered framework to guide optimal care for an individual by providing individualized targeted care and coordinating community-based services to achieve an outcome driven by shared responsibility and participation between the child, family, community, and health providers.\(^1\) Systems of care is particularly relevant to children because they are not independent, cannot fully participate in making decisions, or ensure care is carried out as recommended and must rely on a supportive system to prevent and treat disease. Obesity is a chronic disease characterized by risk factors which are affected by the interplay of influences among family, school, community, and society in the child's life. This is depicted in the adaptation of Bronfenbrenner's ecological model\(^2\) and care of the child with obesity and aligns with the systems of care framework (Figure 21-1).

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**Figure 21-1.** Modified ecological model for childhood obesity.
Brief history of systems of care framework

The systems of care framework began as a mandate to the National Institute of Mental Health (NIMH) from Congress in 1983 to create a guide to care for children with serious mental health impairments. Once developed, the NIMH disseminated the guide through the Child and Adolescent Service System Program, providing funding and technical assistance to the states. Over the next 3 decades, several initiatives funded by the federal and state governments and private entities such as the Robert Wood Johnson Foundation (RWJF) and Anne E. Casey Foundation helped further fine tune, strengthen, and implement a system of care based on the following core values.1

1. Type and mix of services provided must be dictated by the child’s and family’s needs.
2. Strength-based services, case management, interagency collaboration, and decision making should be provided in partnership with the family.
3. Agencies, programs, and services must be responsive to the cultural, racial, and ethnic differences of the population they serve and provide culturally competent care.

With these values, the characteristics of care provided become cohesive, patient directed, and effective, as shown in Table 21-1. In summary, systems of care is not a model but rather a structure within which different models and techniques can coexist and be adapted to meet the child’s needs.

The Patient Protection and Affordable Care Act

In March 2010, President Barack Obama signed into law the Patient Protection and Affordable Care Act (ACA), the widest-ranging reform of our system of care in the past 4 decades.3 ACA is a comprehensive reform of the health care system, with provisions to expand access to insurance, increase consumer protections, emphasize prevention and wellness, improve quality and system performance, expand the health care workforce, and decrease health care costs. It has the potential to significantly impact the way health care is provided, especially for chronic conditions such as obesity.

Two sections of the ACA, Improving the Quality and Efficiency of Health Care (Title III) and the Prevention of Chronic Disease and Improving Public Health (Title IV), are especially relevant to childhood obesity.3 Components of Title III include the creation of an Innovation Center within the Centers for Medicare and Medicaid Services to test, evaluate, and expand different payment structures and methodologies to reduce program expenditures, while maintaining or improving quality of care. To evaluate current care,
Table 21-1 CHARACTERISTICS OF SYSTEMS OF CARE AS SYSTEM REFORM INITIATIVES

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<tr>
<th>From fragmentized service delivery</th>
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<tr>
<td>Categorical programs or funding resources</td>
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<td>Limited service availability</td>
<td>Multidisciplinary team and blended resources</td>
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<td>Reactive, crisis-oriented approach</td>
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<td>Focus on &quot;deep end&quot; restrictive settings</td>
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<td>Children within families</td>
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<td>Centralized authority</td>
<td>Community-based ownership</td>
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<td>Creation of &quot;dependency&quot;</td>
<td>Creation of &quot;self-help&quot; and active participation</td>
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<td>Child-only focus</td>
<td>Family as focus</td>
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<td>Needs or deficits assessments</td>
<td>Strengths-based assessments</td>
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<td>Families as &quot;problems&quot;</td>
<td>Families as &quot;partners&quot; and therapeutic allies</td>
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<td>Cultural blindness</td>
<td>Cultural competence</td>
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<td>Highly professionalized support</td>
<td>Coordination with informal and natural supports</td>
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<td>Child and family must &quot;fit&quot; services</td>
<td>Individualized or wrap around approach</td>
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<td>Input-focused accountability</td>
<td>Outcome or results-oriented accountability</td>
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<td>Funding tied to programs</td>
<td>Funding tied to populations</td>
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Identify research priorities and conduct research that compares the clinical effectiveness of medical treatments; the ACA emphasized comparative effectiveness research and mandated the establishment of a nonprofit Patient-Centered Outcomes Research Institute (PCORI). Additional initiatives include community-based collaborative care networks referred to as accountable care organizations (ACOs) and support for patient-centered medical care.

Through these initiatives, Title III seeks to shift how care is provided to a more patient-centered, need-based approach that recognizes the link between lifestyle behaviors and disease, while being sensitive to the cost, effectiveness, and quality of care. Title IV supports the establishment of the National Prevention, Health Promotion, and Public Health Council to determine and coordinate a national public health strategy on prevention and wellness. Other
components include increased access to clinical preventive services, enhanced reporting of racial or ethnic data for analysis of disparate outcomes, funding for childhood obesity demonstration projects, and nutrition labeling of standard menu and vending items.

Lifestyle behaviors have an enormous impact on health outcomes; the advantage of the ACA for childhood obesity is its national mandate to address lifestyle behaviors at both an individual and population level, while incorporating public health policy and community programs into our current system of health care. When implemented, this mandate has the potential to support reimbursement for lifestyle counseling provided by pediatric health care providers, allied health professionals, for example, dietitians and community-based health workers and coaches. More importantly, the ACA recognizes the importance of prevention as the first step of obesity management through its funding support for obesity demonstration projects, support for patient-centered care, and QI within the healthcare system.

In the next section, we will review the Ecological Model (EM) and the Chronic Care Model (CCM). Both models are critical to understanding, preventing, or treating childhood obesity and relevant to establishing a system of care as outlined within the ACA.

The ecological model

The modified EM (see Figure 21-1) provides an ideal approach to the evaluation of behavioral and environmental assessments in clinical and nonclinical contexts.

The EM embraces the following core principles:

1. Factors within multiple levels of intrapersonal, interpersonal, organizational, community, and public policy influence specific health behaviors.
2. Influences on behavior interact across these different levels.
3. Ecological models should be behavior-specific.
4. Multilevel interventions should be most effective in changing behavior.

Case

Peter, an 8-year-old boy, was found to have a body mass index (BMI) at the 88th percentile during his annual well-child examination. He eats 3 meals and a snack daily. He qualifies for subsidized meals, so he eats breakfast in addition to lunch at school (a marker for low socioeconomic status). His 16-year-old brother picks him up from school, as his mother...
is at work and they usually stop by a fast-food restaurant on the way home to get a kid’s meal with soda as his “snack” (accessibility and convenience foods and restaurants). They are a “meat and potato” family, and occasionally a vegetable is included. His mother believes in only serving fresh vegetables, which she usually buys at the only full-size grocery store 12 miles from their home (family perceptions, community food desert). He gets to eat first, usually alone, so he can get to bed on time (mealtine behavior).

During recess, he plays with his friend on some days. On other days, he doesn’t get picked for teams because he is not very athletic. The family has ample and unused backyard space, but his mother is concerned about neighborhood safety, so he is usually indoors (community safety, family physical activity, or sedentary behavior). She does not allow him to bike in the evenings unsupervised as they live next to a busy street, but the family participates in a monthly community biking activity (community safety or zoning or family activity). Peter recently got an i-Pad to use for homework, but has discovered the game apps. He spends 3 to 4 hours on homework and gaming (screen time or sedentary activity).

Historically, the EM has its origins in Bronfenbrenner’s micro-, meso-, and macro-levels of influence, and has evolved to demonstrate the interactions between familial, cultural, community, organizational, and policy levels of behavior (see Figure 21-1). Because obesity is the result of complex interactions between genetics, behavior, and environments, the ecological model framework highlights the interactions of these influences. For example, lack of access to fresh fruits and vegetables (community, policy) will limit a parent’s likelihood of purchasing these food items (family) and the child’s consumption and preference (child).

This case illustrates that information obtained using an ecological approach can provide a more complete picture of the child’s risk factors, help in individualizing recommendations, and allow the child, family, and pediatric health care provider identify interventions most likely to be relevant or effective. At the individual or family level, family schedules, perceptions, and behaviors provide potential areas for education, goal setting, and skill-building. Zoning issues (advocacy opportunity) may not be immediately addressed, but alternatives for indoor physical activity such as specific timed exercises and DVDs can be recommended and negotiated. Physical activity can even be integrated into homework break times. The family’s monthly biking activity provides an opportunity to provide suggestions for more frequent activities. Information about nearby county or city walking paths, or parks and recreation facilities
from his city or county public health department can be used to make the family more aware of other options for activity or to map a better route home from school.

Other evidence-based topics for discussion include the importance of “together” family meal times, healthy, non–fast food, snacks, and the relationship between increased screen time and increased BMI. Despite living in a food desert, more vegetables can be introduced into Peter’s diet if his mother understands that frozen and canned vegetables are adequate replacements for fresh ones, and is introduced to planning and preparing meals in advance (skil-l building). These educational opportunities can lead to direct shared goal setting around screen time, minutes of daily physical activity, vegetable and fruit consumption, and family meals eaten together. In addition, this personalized information can help Peter, his mother, and health care provider to be more efficient in shared decision-making processes, because it is an opportunity to tackle scheduling, cultural, knowledge, and perception barriers. At another level, parents, through their experience of exploring their child’s health problems in relation to an EM, can be encouraged to become strong advocates for healthier lifestyles in the school and community.

The relationship between the ecological levels, behavior, and intervention is often complex. Personal characteristics related to eating behavior, physical activity, sedentary behavior, perceptions of weight status, or self-efficacy are elements which influence behavior change and shared goal setting. Perceptions, behaviors, and resources within the family as well as factors such as the family’s daily, weekly, or monthly work or school schedules, prioritization of healthy lifestyles, coping strategies, income, and mealtime behaviors all affect the child and family lifestyle behavior.

At the community and/or societal level, location of the family dwelling, community assets, socioeconomic level, proximity to and concentration of fast-food restaurants, availability and quality of grocers, parks, recreational facilities, and neighborhood safety are all factors that exert an additional level of influence on the child’s and family’s lifestyle behavior. It is important to recognize that there are often several pathways through which each factor can exert its influence on the child or family. For example, federal school policy on academic performance and standards usually define school schedules, limiting opportunities for physical activity during the school day. State-level budgetary policy may mandate a specific funding regimen that leads to fewer school nurses and decreased ability to conduct BMI screening, limiting the potential to use the school BMI screening as an avenue to communicate concern about the child’s weight to the parent and encourage intervention.

> Behavior change is expected to be effective when environments and policies support healthful choices, when social norms and social supports for healthful choices are strong and when individuals are motivated and educated to make these choices.

Other factors at a societal level that are important include diversity of resources available to the child, access to the health care system, and the stability of the community. For instance, state and local policies for schools, zoning, joint use agreements between schools and the neighborhood, farm to school programs, walk to school programs, workplace wellness, and safety policy may hinder or facilitate potential strategies for intervention that eventually affect the child’s weight. Understanding these interrelationships and consequences within the EM is also an opportunity for advocacy, community collaboration, and capacity-building.

While the EM is an excellent framework to understand etiology of the problem, it provides limited guidance on integrating the framework into a broader administrative setting. Another framework, the CCM, addresses this gap.

The chronic care model

The CCM, an evidence-based approach to chronic diseases, provides an opportunity to use a systems level approach to address socioecological influences and maintain continuous QI. The framework is broad enough to address the social contexts of disease and flexible enough to accommodate individual customization. Tenets of the CCM are emphasized in Healthy People 2020, with its emphasis on shared decision-making between child, family and providers, personalized self-management strategies and resources, improved health literacy, cultural competency, and outreach to diverse and underserved populations.

The CCM was created by Edward Wagner and colleagues at the Group Health Cooperative of Puget Sound, Seattle, WA based on a review of interventions in chronically ill populations. Systematic reviews on the use of CCMs in obesity, diabetes, and cardiovascular disease have demonstrated a positive correlation between the number of components of the model used and the effectiveness and quality of care.

In this section, we will review strategies for integrating the 6 components of the CCM into the evaluation, prevention, and treatment of child and adolescent obesity (Table 21-2).

1. Health care organization

Elements of the ideal health care organization should be driven by a leadership committed to (1) an environment that promotes safe, equitable, effective, patient-centered, culturally sensitive, and evidence-based care; (2) policy and fiduciary support for a system that effectively implements evidence-based strategies; and (3) promotion of continuity of care and community networks that enhance care.
<table>
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<tr>
<th>CCM component</th>
<th>Potential QI measures</th>
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| Health care organization      | • Specific measures of adherence to mission that prioritize obesity, community linkages, incentives for quality of care  
                                | • Adherence to and implementation of NCQA medical home standards                        
                                | • Evidence of capacity building for culturally competent care, e.g., number of opportunities for diversity training |
| Decision support              | • Percentage of children with overweight or obesity identified, assessed, and counseled  
                                | • Percentage of children with obesity and with comorbidities documented               
                                | • Percentage of adherence to comorbidity guidelines                                    
                                | • Number of physicians completing obesity training                                     
                                | • Number of health care providers using customized handouts                             |
| Self-management support       | • Percentage of BMI assessed at each visit                                              
                                | • Percentage of signed self-management contracts                                       
                                | • Percentage of change in physical activity                                         
                                | • Percentage of change in fruit and vegetable consumption                       
                                | • Percentage of improvement in patient's or family's self-efficacy                     
                                | • Percentage of action plans with follow-up scheduled                               
                                | • Percentage of families satisfied with patient-provider interaction                   
                                | • Number of times provider presented information that was easy to understand          |
| Delivery system design or e-design | • Extent to which principles of access, cultural competency, and family support are reflected in vision, policy, and procedure (administrative commitment)  
                                  | • Number of designated staff for coordination of care                                  
                                  | • Number of procedures in place for eliciting patient or family perspectives           
                                  | • Documentation of use of community resources                                       
                                  | • Number of changes made to improve access to care                                    
                                  | • Evidence of planning to accommodate components of the CCM                          |
| Clinical information systems  | • Availability of medical record at time of visit                                       
                                  | • Percentage of integration of clinical data from other internal or external sources    
                                  | • Number of and type of reports available                                             
                                  | • Length of time for trend data (growth charts)                                       
                                  | • Documentation of use of registry protocols for visit reminders, attrition            
                                  | • Extent to which laboratory data are tracked                                         |

(Continued)
Table 21-2  THE CCM AND POTENTIAL QI MEASURES (CONTINUED)

<table>
<thead>
<tr>
<th>CCM component</th>
<th>Potential QI measures</th>
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<tr>
<td>Linkage with</td>
<td>• Number of linkages to community wellness resources</td>
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<tr>
<td>community</td>
<td>• Number of official partnerships</td>
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<tr>
<td>resources and</td>
<td>• Percentage of referrals made to community resources (specific area)</td>
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<tr>
<td>policy or</td>
<td>• Number of educational forums (obesity awareness, consequences, management) offered</td>
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<td>policy advocacy</td>
<td>health care providers</td>
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<td>(can include</td>
<td>community</td>
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<tr>
<td>community</td>
<td>• Number of community educational forums (obesity awareness, consequences, management)</td>
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<tr>
<td>capacity building</td>
<td>community or catchment area</td>
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Abbreviations: BMI, body mass index; CCM, Chronic Care Model; NCQA, National Committee on Quality Assurance; QI, quality improvement.

For instance, health care organizations can require identification and recognition of obesity as a diagnosis, create prompts and algorithms that support treatment guidelines into electronic health records, and establish mechanisms for reporting and tracking QI indicators and patient outcomes. Linkages with community resources can be integrated into care by building community collaborations and incorporating the services of social workers, health coaches, or community case managers.

2. Decision support

Decision support provides the best current clinical research to support clinical decision-making to improve quality of care. The components of decision support are: (1) integrating evidence-based guidelines into practice, (2) linking the expertise of both primary care and subspecialists, (3) using optimal provider training, and (4) using proven patient education strategies to improve quality of health care. The 2007 American Medical Association (AMA) Expert Committee recommendations on the “Prevention, Assessment, and Treatment of Child and Adolescent Overweight and Obesity: Summary Report” (discussed in Chapter 12) guides decision making for the health care provider in caring for the child with obesity.9

The use of pediatric obesity evidence-based guidelines can be supported by clinical information systems, can facilitate interdisciplinary collaboration, and provide the underpinnings for self-management support, another component of the CCM crucial for the success of obesity interventions.

3. Delivery system design

The delivery system infrastructure is designed to ensure safe, effective, culturally, and linguistically appropriate care, case management, and a system
of referrals and linkages.\textsuperscript{4,10} Given the risk of numerous comorbidities in the child or adolescent with obesity, a strong care delivery system can lead to better outcomes. As electronic health records become more widespread, they can be configured as an optimal delivery system for obesity management. For instance, the electronic health record can assist with the tracking of individuals and groups of patients (databases or registries), documenting the need for interpreter services, tracking diagnoses of comorbidities or problem lists, appointments, referrals, and intervention outcomes.

A challenge with obesity interventions is the need for frequent visits with the health care team in order to sustain the behavior changes. A delivery system design such as a patient care web portal linked to an electronic health record can improve communication about the child's care and decrease the need for some of the face-to-face visits. In this case, the portal can be designed to capture and support the patient's preferences and resources. Other care delivery systems include the use of multidisciplinary teams, home visitation, tele-health, medical-legal integrative models, and collaborative social service-medical models (practices which house linked clinical and social service practices).

4. Clinical information systems

The function of clinical information systems is 2-fold: (1) to identify relevant populations or subpopulations for proactive care, and (2) to monitor the progress of the practice team and the health care system.\textsuperscript{11} Most often, this involves the creation of patient registries. Most obesity programs located at children's hospitals or academic medical centers have patient care registries that track patient and provider characteristics, disease severity, comorbidity, quality of life, patient satisfaction, and treatment outcomes. Registries can also provide administrative data such as patient volume, insurance status, attrition, clinic cancellation, or utilization rates, which are invaluable for program development, benchmarking, resource allocation, and business plan development.

Clinical information systems can also support telemedicine, defined by the American Telemedicine Association (ATA) as “use of medical information exchanged from one site to another via electronic communications for the purpose of improving patient health status.” Telemedicine has been used successfully in remote physiologic monitoring, web-based self-management, remote consultation for assessment, diagnosis and treatment, and telephone counseling. The modality of text message prompts and counseling has been used successfully in several public health initiatives, allowing for increased reach for interventions.\textsuperscript{12} The use of telemedicine in providing pediatric obesity management in rural settings has been successful.\textsuperscript{13,14} It provides sub-specialty support to the primary care provider and allows for replication of the multidisciplinary tertiary care experience remotely with adequate levels of patient acceptability and satisfaction.\textsuperscript{15}
5. Self-management support
The goal of self-management is to empower and prepare the chronically ill patient and family to manage their health by improving their health knowledge and literacy level, their ability to navigate the health care system to meet their needs, and increase their self-efficacy to manage all phases (medical, emotional, occupational) of their chronic condition. Self-management support is crucial to the CCM because it interfaces with the health system and the patient's community.16

In tackling childhood obesity, self-management support begins with identification and acknowledgment of the child's weight status and lifestyle behavior by the provider, family, and patient. After identification and comprehensive assessment, effective measurable strategies for intervention and self-management support can be developed. For chronic conditions like obesity, it is essential that strategies include assessing receptivity, motivational interviewing, activation, shared decision-making for goal setting, problem solving, and a customized action plan summarizing the goals. These goals can be tracked to coincide with patient outcomes and QI measures.

6. Linkage with community resources
Patients and their families are influenced and supported by their communities. Given the obesogenic environment, linkage to resources with a healthy lifestyle focus can have a positive effect on health outcomes and can help eliminate accessibility as a barrier to sustainability. Creating community referral networks builds the capacity within the child's environment to treat or prevent obesity, because most obesity interventions do not occur only within the health care setting. Partnerships with public health and service agencies, faith-based organizations, schools, businesses, media outlets, and community-based organizations can be synergistic and contribute to health outcomes by increasing awareness around weight gain and healthy lifestyle behaviors (see Chapters 19 and 20). Community referral networks can be opportunities for advocacy, research, and/or community service projects. The collaborative process between the health care provider, the child and family, which links their community resources to their treatment plan, is a component of a patient-centered medical approach and can be led by a group of stakeholders in the community.

The patient- or family-centered medical home
The Institute of Medicine defines patient centeredness as "providing care that is respectful of and responsive to individual patient preferences, needs and values, and ensuring that patient values guide all clinical decisions."17 In pediatrics, the patient-centered medical home (PCMH) is often used interchangeably with the term "family-centered medical home," because the child is not
able to make independent decisions as part of his or her health care and is dependent on a parent or legal guardian for the basic necessities of everyday living. In the ideal setting, the family is the “primary source of strength and comfort” for the child and is a vital member of the health care team.

The concept of the PCMH was first introduced by the American Academy of Pediatrics (AAP) in 1967 in reference to children with special health care needs.\textsuperscript{18} It has been further refined and expanded from an emphasis on the patient-provider relationship to include the health system, while addressing the social determinants of health.\textsuperscript{19} There is significant overlap between the components of the ACA, the CCM, and the PCMH. Currently, the National Committee on Quality Assurance (NCQA) along with other certifying bodies has developed evaluation and certification standards to ensure consistency across PCMH clinics.\textsuperscript{20}

Components of the PCMH are as follows:

1. An ongoing relationship with a personal physician trained to provide first contact, continuous and comprehensive care.
2. Physician-directed medical practice with a team approach.
3. Holistic orientation with an emphasis on patient knowledge, needs, and barriers.
4. Coordinated and/or integrated care across all elements of the complex health care system (eg, subspecialty care, hospitals, home health agencies, nursing homes) and the patient's community (eg, family, public, and private community-based services). Care is facilitated by registries, information technology, and health information exchange.
5. Quality and safety hallmarks characterized by a care planning process, evidence-based medicine, accountability, performance measurement, mutual participation, and decision making.
6. Enhanced access to care through systems modifications, such as open scheduling, expanded hours, and new options for communication between patients, their personal physician, and practice staff.
7. Reimbursement appropriately cognizant of the added value provided to patients who receive care at a PCMH beyond the traditional fee-for-service encounter.

For the child with obesity, the PCMH offers an opportunity to coordinate care. In most multidisciplinary obesity programs, the medical provider can take care of some comorbidities related to weight; for example, hypertension, polycystic ovarian syndrome, fatty liver, type 2 diabetes, while coordinating care with subspecialists and allied health providers (registered dietitian, activity specialist, psychologist). For example, for the patient with type 2 diabetes, the team can focus on intensive weight loss and meal plans, while tracking HbA1c, medication tolerance and safety. This information can be shared with
the endocrinologist, who may see the patient twice a year and be responsible for handling medication adjustments and complications. In this manner, the patient’s care is focused, with improved patient compliance, fewer discordant office visits, and less school absenteeism due to illness.

**QUALITY IMPROVEMENT**

QI is the purposeful change of a process using systematic efforts to improve the reliability of achieving an outcome. QI projects can help generate hypotheses and provide impetus and confidence to implement innovative changes in care. In clinical settings, the ultimate goal is to change health care provider or health system behavior in a consistent pattern to improve quality of care. Benefits of a successful QI process are: (1) improved patient experience, (2) decreased cost to the patient and system, (3) improved patient health, and (4) sustainability of programs or clinical care protocols.21,22

The process of improvement often referred to as the Plan-Do-Study-Act (PDSA) cycle involves identifying the problem, developing a course of action, implementing and evaluating the change, and determining the next steps. In the following section, we will use 2 case studies to discuss the PDSA cycle. The activities involved in a PDSA cycle are described in Table 21-3.

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<th>Table 21-3 PLAN-DO-STUDY-ACT (PDSA) CYCLE</th>
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Case

Dr Jones, a new preceptor at a residency continuity clinic, noted that Samantha, a 15-year-old Caucasian girl, had been treated for a fungal skin infection 4 times in the prior 7 months. A more detailed review of Samanthas medical records revealed her weight was most likely an underlying risk factor for the fungal skin infections. Samantha weighed 302 lb, had a BMI of 56, multiple skin folds, and a large panniculus. Yet, obesity was not listed as a diagnosis on her problem list (identify problem). Dr Jones wondered if this omission was an isolated case or a potential area to improve care. In a subsequent review of 20 charts of patients with abnormally high BMI percentiles, she found that 20% did not have a documented BMI because the height measure had not been taken, only 50% had been appropriately identified as overweight or obese at their well-child visit, 24% had obesity listed on their problem list, and 30% had a documented treatment plan (identify the problem). The clinic decided to conduct several QI projects to improve identification and counseling rates.

Case

The no-show rate at an obesity clinic was 33%, limiting efficient use of resources and threatening the sustainability of the program (identify the problem). The clinic leadership decided to implement a QI plan to decrease the no-show rate. They identified their aim as "To decrease the no-show rate in the clinic from 33% to 25% and sustain this rate for the next 6 months" (identify a performance indicator and target goal). To plan a course of action, the clinic leadership identified possible reasons for the high no-show rate shown in the fishbone diagram (Figure 21-2A). Prior to creating change cycles, they organized a brainstorming session with the larger team to include expertise from other disciplines and administrative support staff (evaluate and implement a change). This brainstorm led to the creation of a revised fishbone diagram (Figure 21-2B) that was more comprehensive and had better team buy-in. Following implementation of several concurrent PDSA cycles, some changes were adopted or abandoned, and the no-show rate dropped from 33% to 24% in 6 months.
FIGURE 21-2. (A) Initial fishbone diagram on no-show rates. (B) Revised fishbone diagram on no-show rates with team involvement. (Data from Center for Healthy Weight and Nutrition, Nationwide Children's Hospital, Columbus, Ohio.)
CHAPTER 21  Systems of Care and Quality Improvement

PDSA CYCLE: IDENTIFY THE PROBLEM AND DEVELOP A PLAN

Three questions guide the initial process for any PDSA cycle.

What are we trying to accomplish?

This question helps the team to decide the reason or rationale for an improvement. Once the rationale is determined, it becomes easier to envision the prediction or aim statement because it isolates the primary area that needs to be improved. In the case study, the rationale for the QI project is that a high no-show rate results in underutilization of resources, decreased revenue, and limited program sustainability; while for the continuity case study the health problem is not being identified or addressed, resulting in inadequate care. In crafting the aim statement, it needs to be specific, measurable, attainable, realistic, and time bound (SMART).

How will we know that a change is an improvement?

For this question, the team will need to identify the outcome(s) and decide how to measure the outcome(s) of the proposed change. Usually, the outcome will involve the patient and/or the process of change. In determining an outcome for the project, it is important to think through how the proposed outcome or change may affect another aspect of the project, or even clinic operations totally unrelated to the QI project. This type of unintended outcome is referred to as a balancing outcome. For example, if the team decided that BMI would be documented at all clinic visits, not only at well-child visits, a balancing outcome to consider is that perhaps the nurses will take more time to complete each patient’s intake assessment. This balancing outcome may subsequently lead to longer visit times and disrupted clinic flow. The team may need to review the accessibility and availability of the stadiometer, especially if several patients are coming in at the same time, train the nursing staff to be comfortable with getting height measures quickly and accurately, and have a back-up plan when clinic flow gets bogged down.

Once the outcome has been defined, the next step is to identify a performance indicator to measure the outcome. An ideal performance indicator needs to provide scientifically grounded information on the process, outcomes or services, be clinically relevant, and amenable to change. In the continuity clinic case, there are 3 potential performance indicators depending on the planned change to be tested, that is, percent of children with obesity (1) identified at a well-child visit; (2) with a diagnosis of obesity on the problem list; and (3) who received nutrition and/or physical activity counseling. For the case of the no-show rates, the ideal performance indicator can be the no-show rate for
the project, but will differ for each PDSA cycle targeting a problem that will improve the no-show rate (see Figure 21-2).

**What change can we make that will result in an improvement?**

For this question, the team decides on what changes need to be tested to improve care. This is an essential step, because many changes can be implemented, but usually only a handful result in meaningful improvement. Very often, teams do not spend enough time on this question or involve all key stakeholders. Brainstorming with a more inclusive group yields more information, and promotes collaboration and acceptance of the planned change. Productive brainstorming techniques include walking through the process, using experience from comparable projects, thinking outside the box, and obtaining expert input. These sessions do not need to be formal. They can be done in several brief 10- to 15-minute periods when there is limited get-together time and are best led by a team-identified facilitator.

In the case of high no-show rates, findings from the brainstorming session were presented in a fishbone diagram (see Figure 21-2), which provides a visual representation of possible causes for the identified problem and a framework to guide the discussion around change. These diagrams are particularly helpful when large, multidisciplinary groups are involved. In a fishbone diagram, the causes or steps can be grouped into categories (e.g., no-show rate related to lack of patient satisfaction) and further broken down into subgroups (e.g., patient satisfaction can be affected by long wait times between visits, poor communication between front office staff and the patients, or mismatch of patient and program expectations).

**PDSA CYCLE: EVALUATE AND IMPLEMENT A CHANGE**

Responses from these 3 questions address the first 3 steps of a PDSA cycle. Once the change has been determined, the team should make a list of all the stepwise tasks and determine who is responsible for each task, where and when each task will be carried out, and how to collect data. The team can then implement (Do), evaluate (Study), and decide on the next steps (Act) using a PDSA worksheet (Table 21-4).

**Why test a change before implementing it?**

Benefits to running PDSA cycles before implementing a change are as follows:

- Allow for testing whether the change will be successful before wholesale implementation
- Enhance buy-in from the team, because they have been a part of the process for change
### Table 21-4 PDSA (PLAN-DO-STUDY-ACT) WORKSHEET

<table>
<thead>
<tr>
<th>Team:</th>
<th>Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cycle</strong></td>
<td></td>
</tr>
<tr>
<td>Plan</td>
<td></td>
</tr>
<tr>
<td><strong>Project aim:</strong></td>
<td></td>
</tr>
<tr>
<td>Prediction for cycle</td>
<td></td>
</tr>
<tr>
<td>Tasks to accomplish</td>
<td></td>
</tr>
<tr>
<td>(Who is responsible, where will it be done, when will it be done?)</td>
<td></td>
</tr>
<tr>
<td><strong>Do</strong></td>
<td></td>
</tr>
<tr>
<td>What happened when you ran the test? What did you observe?</td>
<td></td>
</tr>
<tr>
<td><strong>Study</strong></td>
<td></td>
</tr>
<tr>
<td>What did you learn? How does it compare to your prediction?</td>
<td></td>
</tr>
<tr>
<td><strong>Act</strong></td>
<td></td>
</tr>
<tr>
<td>What will be the next steps based on what you have learned?</td>
<td></td>
</tr>
<tr>
<td>Act? Abandon? Further testing?</td>
<td></td>
</tr>
</tbody>
</table>

- Are cost effective and involve less risk, because the cycles are conducted on a small scale
- Provide new knowledge regardless of whether the change is successful or not
- Support continuous improvement to sustain change

PDSA cycles are usually small change steps with small sample sizes. The plan to increase appropriate documentation of obesity on the problem list may involve adding a nurse alert or an electronic medical record (EMR) alert to any BMI above the 85th percentile, having the healthcare provider cross-check accuracy of the alert and document the diagnosis of obesity on the problem list. These steps can be carried out by 2 resident physicians in the clinic for over 2 days, the results studied, and the team can decide whether to implement the change (adopt), abandon it, or initiate further study as a new PDSA cycle.

PDSAs can be conducted sequentially and/or concurrently. Sequential PDSAs, often referred to as repeated cycles, are used in change cycles where the results do not adequately meet the project aim, the plan was unrealistic or cumbersome, or a negative unintended consequence occurred in another part of the change process. Concurrent PDSAs are often used in projects that are fairly complex and involve a large team. In trying to improve no-show rates, the team conducted several concurrent and sequential PDSAs, given there were several areas that were amenable to change and which could decrease the clinic’s no-show rate.
Data use and analysis

Data collected pre- and postimplementation of the change can be reported in a variety of ways. A commonly used method is a time series graph called a run chart. With run charts, data are reported at specified intervals; that is, weekly and monthly. This makes it easier to identify trends or patterns in the process of change and allows for proactive adjustment to the process as needed. The unit of measurement for the performance indicator and the time intervals are on the y-axis and x-axis, respectively. Key events that are significant to the change process can be noted on the x-axis. It is often helpful to plot the target goal on the run chart, as shown in Figure 21-3. Alternatively, a range of other levels for the outcome measure (e.g., threshold, target, and maximum goal) can be highlighted on the run chart, too. In this way, the run chart tells a visual story about the QI change. Figure 21-3 is the run chart for improving obesity identification, showing that the clinic met their goal 7 months after initial implementation of the PDSA cycle.

Quality improvement and maintenance of certification

The American Board of Pediatrics (ABP) Maintenance of Certification (MOC) requires the physician to complete a QI project as part of their pediatric board recertification. This chapter reviews the key areas of a QI project required by the ABP. There are restricted (limited to a specific learning collaborative) and open obesity-related QI projects. Most require 3 or more PDSA cycles interspersed with a downtime period used for analyzing the results, problem solving, and implementing any changes needed before the next PDSA cycle. Figure 21-4

![Overall obesity identification chart](image-url)

**FIGURE 21-3.** Time series graph or run chart on obesity identification in the clinic. (Data from Nationwide Children's Hospital Primary Care Network, Columbus, Ohio.)
Quality improvement: systems mapping evaluation for pediatric obesity. (Reproduced with permission from The Health and Obesity: Prevention and Education Curriculum Project. Quality Improvement: Systems Mapping Evaluation of Obesity, Regents of the University of California.)
is a sample of the process for the Health and Obesity: Prevention and Education (HOPE) project, a part 4 obesity-related MOC project developed by the University of California, San Diego. In addition, a new MOC obesity module based on the HOPE project is under development by the AAP.

Quality improvement and multisector obesity collaborative groups

An innovative use of QI techniques has been to apply them across multisector collaborations that address obesity prevention or treatment. A framework such as the CCM can be used to guide areas for QI across multisector collaborations (see Table 21-3). An example of such a project is the National Initiative for Children’s Healthcare Quality Healthy Weight Collaborative, a 2-phase QI initiative to promote healthy weight and health equity across the public health, health care, and community sectors. The collaborative used the model of improvement, which requires specific and measurable aims, measures of improvement that are tracked over time, key changes that will result in the desired improvement, and a series of testing “cycles” during which teams learn how to apply key change ideas to their own organizations and communities. In phase 1, 10 cross-sector partnerships and multidisciplinary teams representing different regions of the United States addressed 6 program strategies on policy, primary care, and community collaborations to implement changes customized to their community. For phase 2, 40 additional teams integrated lessons learned by the phase 1 teams to guide obesity prevention and treatment projects in their local communities.

SUMMARY

Optimal management of childhood obesity can only occur within a system of care that recognizes the social determinants of the disease, improves accessibility and quality of care, and emphasizes patient engagement. Pediatric health care providers need to assess and acknowledge patients’ needs and readiness to make changes, understand the context of their daily life within their community, and anticipate potential challenges that will derail their efforts at maintaining a healthy lifestyle. The treatment plan has to be conceptualized with the child’s and family’s input, and remain responsive to changes within the larger health care system. Using the case studies, this chapter illustrates each step of this process within the theoretical framework of the ecological and Chronic Care Models and provides an introduction to QI methods that can be applied at an individual or systems level to enhance care of the child with obesity.
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