

**North Carolina First Step Program:
Improving Provider Assessment of Childhood Obesity**

By

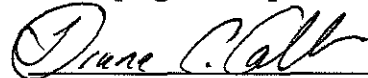
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A Master's Paper submitted to the faculty of
the University of North Carolina at Chapel Hill
in partial fulfillment of the requirements for
the degree of Master of Public Health in
the Public Health Leadership Program.

Chapel Hill

2009

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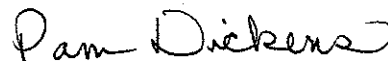


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Abstract

The United States' worsening prevalence of childhood overweight/obesity has stimulated substantial attention from the medical community. Several medical organizations have acknowledged that one of the most important steps in addressing the problem is early detection. Yearly overweight/obesity screening with Body Mass Index (BMI) for all children is standard of care, however, many practitioners are non-compliant with these guidelines. As a result, overweight/obese children are being underdiagnosed, causing missed opportunities for secondary prevention and early treatment. The North Carolina (N.C.) First Step Program is an intervention aimed at helping providers assess pediatric weight status more accurately and consistently. The program incorporates changes in multiple levels of the patient encounter and is designed to be both cost-effective and time-efficient. This Master's paper describes the planning and evaluation of the N.C. First Step Program.

Introduction

Childhood obesity in the United States (U.S.) is increasing at an alarming rate. The 2003-2006 National Health and Nutrition Examination Surveys (NHANES) reports an increase in childhood obesity prevalence from 5% to 12% in 2-5 year olds, 7% to 17% in 6-11 year olds, and 5% to 17% in 12-19 year olds, since the 1976-1980 NHANES.^{1, 2} These percentages are predicted to not meet the nation's Healthy People 2010 goal of only 5% of U.S. children being overweight or obese by 2010.³ North Carolina (N.C.) is also affected by this increasing childhood obesity trend. The 2007 N. C. Child Health Assessment and Monitoring Program (CHAMP) reports 16% and 13% of N.C. children are overweight and obese, respectively.^{4, 5} Similar to the projected national failure, N.C. 2010 Healthy Carolinas' goal of reducing childhood obesity prevalence to 10% by 2010, will likely not be reached.⁶

Addressing the childhood obesity epidemic is important because of the negative health consequences associated with excess fat. Overweight/obese children are developing obesity-related co-morbidities previously only diagnosed in adulthood, such as hypertension, atherosclerosis, type 2 diabetes mellitus, obstructive sleep apnea, gastroesophageal reflux, and joint pain.⁷⁻¹¹ The environmental obstacles and negative social stigma society places on overweight/obese children, often leads to them developing low self-esteem and depression.^{9, 10} These diseases, including obesity, often extend into adulthood causing loss of productivity, decreased quality of life, and premature mortality.^{8, 9, 11, 12}

In addition to individual health consequences, the worsening childhood obesity epidemic is expected to increase costs in an already economically-strained healthcare system.^{9, 13} Extending the body's exposure time to pathology increases the likelihood of a more severe disease process requiring more extensive treatments. Additionally, these diseases cause lower

societal productivity, thereby minimizing the input overweight/obese people return to the healthcare system.

In response to the rising childhood obesity prevalence, a pediatric Expert Committee, compiled of representatives from 15 professional medical organizations, used evidence-based medicine and expert opinion to update the 1998 Expert Committee childhood obesity evaluation and treatment guidelines.¹⁴ Since 2003, the American Academy of Pediatrics (AAP) has recommended that annually a child should have a Body Mass Index (BMI) measured and plotted on an age-adjusted growth chart.¹⁵ Mirroring AAP's BMI recommendations, the Expert Committee's new 2007 guidelines also offer more specifics about other obesity-related practices. For example, the Committee recommends providers assign every child a weight category yearly, in addition to documenting and plotting a BMI percentage. They also renamed weight categories, replacing the "at risk for overweight" category with "overweight" and the "overweight" category with "obese." New guidelines recommend at every Well Child Visit (WCV) providers should assess and counsel every child on healthy nutritional and physical activity (PA) habits; several specific nutritional and PA areas are emphasized. For those categorized as overweight or obese, the Committee recommends additional family history specifically related to obesity, a broader physical exam concentrating on obesity-related changes, and additional laboratory testing screening for diabetes, dyslipidemia, and liver pathology. The Committee also makes recommendations on assessing readiness for change, motivational interviewing, and treatment plans.¹⁴

Pediatric providers are consistently underdiagnosing overweight/obese children, causing delayed intervention.^{8, 10, 11, 16-18} Studies argue that this oversight is a major contributor to the worsening childhood obesity epidemic.^{8, 10, 11} A significant factor contributing to providers

underdiagnosing overweight/obese children is their non-compliance with recommended guidelines.^{7, 17, 19-22} Despite BMI being endorsed from the AAP, the Expert Committee, the Institute of Medicine, United States Preventive Services Task Force (USPSTF), and the Centers for Disease Control and Prevention (CDC) as the recommended weight assessment tool, pediatric providers are still not adopting this practice as standard of care.^{1, 14, 15, 23, 24} Instead, practitioners are using less accurate diagnostic modalities such as visual appearance, weight versus age charts, separate weight and height charts compared to each other, and weight change velocity.^{7, 9-11, 16, 25} A survey study by Barlow et al. showed out of 203 pediatricians, 293 pediatric nurse practitioners (PNP), and 444 registered dietitians (RD), only 19.2%, 16.6%, and 37.8% respectively, use BMI “most of the time.” In this study, pediatricians used clinical impression “most of the time”; PNPs and RDs used weight-for-height percentile “most of the time.” Although similar to BMI charting, weight –for-height charts only measure between 90-137 cm, capturing only approximately 2-9 year olds.⁷ Physicians site multiple reasons for not complying with the BMI recommendations. Reported barriers include time restraints, poor reimbursement, higher ranking health topics, perceived ineffectiveness of counseling, lack of knowledge of recommendations and counseling techniques, patient and parent resistance to behavioral change, and lack of treatment options.^{7, 8, 11, 22, 25}

Soon to be published data from the N.C. Department of Medical Assistance (DMA) shows that N.C. providers serving Medicaid patients follow the national trend of poorly assessing children’s weight status with BMI measurements. This behavior likely occurs with providers servicing non-Medicaid patients as well, however, N.C.’s well-organized Medicaid network system allows easier access and monitoring of the study population. In addition,

poverty is a known risk factor for obesity, so it is especially important for providers treating Medicaid patients to accurately assess pediatric weight status.

Research exploring Electronic Medical Records' (EMR) role in improving provider overweight/obesity screening has been limited, yet promising. EMR can be very costly, requires an information technology staff, and requires a lot of provider/staff training.^{8, 26} The worsening childhood overweight/obesity epidemic requires providers to improve their screening practices urgently. Until more research exists favorably supporting the use of EMR in pediatric weight assessment, and more practices are equipped to implement an electronic system, clinic's are in need of an alternative approach.

The N.C. First Step Program

The purpose of this Master's paper is to describe the planning and evaluation of the N.C. First Step program. The program aims to provide pediatric practitioners with an office-friendly overweight/obesity screening tool that can be implemented more easily, and less costly than EMR. The intervention will include easy-to-use BMI calculation tools, incorporating BMI into patient's vital signs, and creating a multi-level check system. The program's target population will be providers without electronically calculated BMIs enrolled in the N.C. DMA study. Evaluation of the program will include assessment of: 1) the program's impact on provider weight assessment practices; 2) the program's feasibility in a busy primary care setting; and 3) the program's generalizability to a statewide Medicaid and non-Medicaid pediatric population.

Systematic Review

Introduction

Prior studies have shown that many pediatric providers are not following Expert Committee, AAP, CDC, and IOM recommendations to routinely assess children's weight status with BMI.^{7, 19, 21, 22, 27} The N.C. First Step program is designed to aid clinicians in becoming compliant with these recommendations. The purpose of this systematic review is to: 1) evaluate the effectiveness of current practice in identifying overweight/obese children; 2) investigate the effectiveness of office-based quality improvement interventions in improving childhood obesity assessment; 3) describe EMR's effect on improving pediatric obesity.

Methods

A PubMed (MEDLINE) search using several different combination of terms was performed. For all searches limits were set for English, Human Subjects and Children Ages 0-18. Initial terms included, *obesity screening*, *BMI*, and *medical records*. The remaining searches incorporated the MeSH database and included the following combination of terms: 1) *obesity* (subheadings: diagnosis, prevention/control), *child* (subheadings: growth/development, diagnosis, prevention/control), *BMI*, and *medical records*; 2) *overweight* (subheadings: diagnosis, prevention/control), *child*, *mass screening*, and *BMI*; 3) *quality improvement*, *pediatric*, and *obesity*; 4) *medical records systems*, *computerized*, *quality improvement*, and *pediatric*; 4) *medical records system*, *computerized* and *BMI*. Next a Google Scholar search was performed using different combinations of the terms *childhood obesity*, *obesity screening*, *overweight children*, *BMI*, and *medical records*. This large database produced more than 12,000

results. The results were reviewed until there was a consistent trend of titles unrelated to my original search.

Studies included must have reported child's weight category (i.e. healthy weight, overweight, obese) and weight measurement tool used. BMI had to be at least one of the measuring tools studied, however any additional type of measurement tool was eligible. Weight status could be determined from chart text, coding information, or insurance claims. Study participants had to be between the ages of 2-18 years. Results excluded studies containing children with disabilities, in-patient settings, non-primary care or specialty clinics, school-based programs, non-US subjects, and sample sizes less than 100. Additionally, studies conducted prior to 1998 were excluded as the "expert committee" or AAP recommendations to use BMI were not published until then.

The PubMed and Google Scholar search yielded a total of 161 and 100 articles, respectively. 229 articles were rejected based on title and abstract. 32 articles were pulled for full text review of which 10 met inclusion criteria.

Current Weight Assessment Practice

Three retrospective chart reviews of Well Child Visits (WCV) compared how often those identified as overweight/obese via BMI had a corresponding diagnosis documented in their chart.^{10, 11, 17} Documentation of only a BMI number or percentage did not count as a diagnosis; abnormal BMIs had to be interpreted into a weight category to be considered a diagnosis. For those, in which BMI was not documented, study researchers calculated BMI based on documented height and weight. WCVs were used because of their focus on prevention and risk assessment. Many of these studies were published prior to 2007 updated guidelines, so weight

category descriptions will not reflect current nomenclature; “at risk for overweight” is re-classified as “overweight” and “overweight” is re-classified as “obese.”

Dorsey et al reviewed 600 WCV charts of children ages 3-17 in New Haven, Connecticut (CT). Calculated BMIs found 17.6% children were “at risk for overweight” and 20.2% were “overweight.” Sadly, however, only 0.5% of charts had a BMI number documented. BMI percentages were only recorded in 5.9%, 23.3%, and 56.8% of the charts of children “at risk,” “overweight,” and “severely overweight,” respectively. This study showed that of the children who were identified as “at risk” or “overweight,” 79.5% had no documented diagnosis and 83.1% went untreated.¹¹ However, this study was limited by a study population overrepresented by minorities, Medicaid patients and patients in single-parent homes. These demographics increase risk for obesity, which likely created a selection bias of a disproportionate number of obese subjects. That being said, the percentage of “overweight” children in the study was not significantly different than the national average, weakening the argument of selection bias.

O’Brien et al. reviewed 2515 WCV charts and found that of the 9.7% identified obese children, only 53% of them had a corresponding documented diagnosis.¹⁷ As with any chart review, measurement bias exists with using provider documentation as the measurement tool; results may reflect poor provider documentation habits more than actual provider practice. Finally, Louthan et al. reviewed 473 WCV charts from 3 University of Louisville pediatric clinics. Results showed of those identified as “at risk” or “overweight,” only 1.2% and 29%, respectively, had a weight problem documented.¹⁰ This study however, was severely limited by only reviewing charts in a 2-week time frame. Again, limiting the setting to an academic institution with a strong predominance for low-income, inner-city patients creates selection bias. Also, these findings may not be generalizable to private practices, where providers have more

autonomy. None of the charts in the O'Brien or Louthan studies used BMI to assess pediatric weight, suggesting use of other modalities increases the likelihood of missed overweight/obesity diagnoses in children.

The next survey study illustrated BMIs superior effectiveness compared to other modalities in identifying overweight/obese children. Perrin et al. mailed surveys to 2 different groups of primary care pediatricians, each with descriptions of the same 10-year old African-American female. Each group was asked to rank the child's degree of fatness, the provider's level of concern of a weight problem, and provider usage frequency of different weight screening methods. The groups differed by assessment information provided to evaluate the patient. One group received the girl's height, height percentile-for-age, weight, and weight percentile-for-age. The other group received the girl's BMI and BMI percentile-for-age. Both groups were given standard CDC growth charts appropriate for their type of measurement. Looking at the height/weight growth charts, the child's weight plotted to the 75-95th percentile; height plotted to 10th percentile. The child's BMI plotted >95th percentile. Results showed that the BMI group perceived the girl as "too fat" more often than the height/weight group. Additionally, the BMI group had a higher level of concern about her weight than the height/weight group.

Discrepancies in the diagnosis and level of concern are thought to be related to the illusion of normalcy on the weight and height charts, thereby suggesting BMI as a more accurate measurement tool. Only 11% of physicians reported "always" using BMI for pediatric weight assessment. Social desirability may actually cause this percentage to be underestimated; the BMI group may have thought receiving a BMI chart implied it was the correct modality to use. A limitation of this study was the lack of a photograph accompanying the vignette. Although visual impression has been shown to be an inaccurate weight assessment tool, phenotypic

presentation of a child that obese would likely have swayed the height/weight group to a more accurate assessment.¹⁸

One study supported documented BMIs increasing provider recognition of weight abnormalities for obese and severely obese children, but not for overweight children. Benson et al. reviewed the ICD-9 billing codes of 60,711 WCV visits looking for any excess weight diagnoses. Patient records were electronic and had a BMI automatically calculated and plotted. Only 19.2 % of identified overweight children were coded as such. However, 71.5% and 85.5% of obese and severely obese children were coded correctly.⁸ Limiting this study is the measurement tool. Imprecise coding is common, thus excluding ICD-9 codes as a valid surrogate for diagnoses. Using ICD-9 codes with WCV is especially problematic. Anticipatory guidance and screening for multiple health problems are large components of the WCV. Using a single WCV code implies these services were provided. Obesity screening falls under this “all-inclusive” visit and thus even if a problem is addressed, it may not be reflected in the coding.

Office-based Quality Improvement on Childhood Obesity

In 2005, a Cochrane review concluded there was insufficient evidence to support a specific intervention to improve childhood obesity.²⁸ As a result, several studies investigated the role of primary care office interventions in improving childhood obesity through better weight assessment and management. Polacsek et al. investigated the effects a primary care intervention would have on improving provider’s childhood obesity assessment and management. Key components of the intervention included an algorithm for providers outlining prevention, diagnosis, and management of obesity and its related co-morbidities; healthy lifestyle counseling tools to help providers communicate with families; office posters encouraging healthy living; and

technical support. Quasi-experimental chart review (n=600) showed that the intervention significantly increased providers BMI documentation and weight category classification; BMI chart documentation increased from 38% to 94%, BMI percent recorded increased from 25% to 89%, and weight category classification increased from 19% to 79%.²¹

Dunlop et al. compared provider BMI documentation after 2 one-hour training sessions versus after obesity provider toolkit. All subjects participated in the training sessions and then 3 months later were given the toolkit. Training sessions included instructions on using the toolkit, how to assess readiness-to-change, and a physical activity and nutrition counseling guide. Toolkits included a BMI wheel calculator and a BMI %-for-age growth chart. Evaluation of BMI chart documentation for WCVs occurred 3 months post-training and 3 months post-toolkit distribution. Non-significant changes were seen in BMI documentation 3 months post-training. However, 3 months post-toolkit distribution (6 months post-training), providers were 2.4 times more likely to record BMI% in children “at risk for overweight,” and 3.3 times more likely to record BMI % in “overweight” children compared to children with BMI <85th percentile. Results also showed that just having a BMI% growth chart in the patient record increased documentation of BMI% by three times. Conclusions of this study suggest that office-based tools improve provider compliance with recommendations, thereby improving recognition of childhood overweight/obesity.¹⁹ Both the Polacsek and Dunlop studies were limited by lack of a control group and participant blinding; providers were required to be active participants in the interventions. It is possible that documentation improvement was due to providers’ heightened awareness of the area being studied and not due to the intervention tools.

Electronic Medical Records and Pediatric Obesity

Minimal data is available describing the impact of Electronic Medical Records (EMR) on pediatric obesity. Rattay et al. describe a case study from a Delaware primary care clinic network. These clinics transitioned to an EMR system highly focused on childhood obesity for WCVs. The EMR consisted of 8 prompts designed to make provider assessment and measurement of childhood obesity easier and more consistent. EMR components included: 1) automatic calculation of BMI, BMI percentage, and BMI plotting displayed on the same page as other patient vitals; 2) drop-down menu of weight categories of which one must be selected in order to exit patient record; 3) answers to health behavior questionnaire filled out by patient guardian in the waiting room; 4) readiness-to-change evaluation screen with drop-down menu of common healthy goals; 5) for those identified as “overweight” or “obese,” an algorithm of best next step practices based on updated guidelines; 6) checklist for common obesity-related comorbidities and the recommended work-up for each; 7) patient take-home healthy behavior fact sheet; and 8) link to internet-based community resource database. Early 1-year post-intervention with EMR results showed, BMI recording increased to 100% for WCVs. Authors reported biggest intervention challenges were provider resistance, and lengthy time and personnel involvement in the development of the electronic system. Incorporating provider input was key to improving providers’ acceptance of new system.²²

More broadly, other studies have investigated the role of EMR in improving adult obesity assessment and treatment. Both Schriefer et al. and Bordowitz et al. reported electronically recorded BMI improved provider recognition and management of obese patients. These results were not consistent with overweight patients in the Bordowitz study, and the Schriefer study only included patients classified as “obese.”^{29, 30}

Conclusion

This systematic review illustrates that current provider practice in pediatric weight assessment is inadequate. Overweight and obese children are being underdiagnosed because providers are not following the evidence-based guidelines of using BMI for weight assessment. Studies illustrate that office-based interventions improve provider BMI documentation and weight category assignment, however these are intermediate outcomes and more studies are necessary to see if these improvements lead to better obesity prevention, earlier intervention, and reduced obesity prevalence. Current research on EMR's role in childhood obesity is limited. More research is needed in this area as EMR has shown to improve overall quality of care and likely will be implemented in all clinical settings in the near future.^{26, 31-33}

Program Plan

Program Context

The North Carolina First Step program recognizes that identifying children with weight abnormalities is vital to addressing the worsening childhood obesity epidemic. As such, an intervention like First Step which aims to improve provider evaluation of pediatric weight status is prime for this medical crisis.

Political Context: With President Obama emphasizing prevention as a key component to healthcare reform, the N.C. First Step program is sure to have federal and state legislative support. Appropriately addressing weight problems early in life significantly reduces the risk of developing chronic diseases. Consequently, Americans are healthier, reducing healthcare costs. Rising healthcare costs is a major concern for the new administration, so any program helping to address this problem is likely to be well received.

Medical Community Support: First Step would be highly supported by the medical community. The pediatric medical community has recently made strides to improve provider recognition of weight problems. New expert committee guidelines, the AAP, and the IOM all support routine assessment of weight status with BMI measurement.^{14, 15, 23}

National Priority: Addressing childhood obesity through proper diagnoses is of national importance for two reasons. The first is that early intervention results in healthier children, and healthier children cost less money. Most overweight children grow into overweight adults, so the savings accrued from keeping children healthy can have long-term benefits. This benefit is especially important in an environment where funding for federal programs like Medicaid and Medicare continue to dwindle, and insurance premiums continue to rise, resulting in Americans

losing their insurance. Secondly, aggressive childhood obesity interventions like First Step are important because healthy-weight children are less likely to suffer from obesity-related diseases. Without the burden of disease, children are more likely to develop into a productive member of society. The federal government already recognizes the importance of accurately identifying overweight/obese children. The Surgeon General's Call To Action To Prevent and Decrease Overweight and Obesity acknowledges that BMI should be used to assess weight status.³⁴ Additionally, the Centers for Disease Control and Prevention (CDC) encourage the use of BMI by having BMI calculators and BMI growth charts easily accessible to providers on their website.³⁵ Both entities, housed under the U.S. Department of Health and Human Services, also have several reading materials and programs available to the public for childhood obesity prevention and treatment. Finally, the nation's Healthy People 2010 goal of reducing childhood obesity to 5% of the population is a testimony of the nation's commitment to aggressively treating this problem.³

State Priorities: Ranked as having the 5th highest rate of overweight children (ages 10-17) in the nation, adequately diagnosing and treating childhood obesity is of great concern to the state of North Carolina.³⁶ The state program "Eat Smart, Move More NC" has BMI growth charts available online with a supplemental reference guide on how to manage patients in different weight categories. Currently reported at 31%, the N.C. Healthy Carolinians campaign strives to reduce the number of overweight or obese N.C. children to 10% by 2010.^{6, 36}

Acceptability: Providers cite time restraint as one of the main reasons for not calculating and plotting BMI.^{7, 8, 11, 25} For the First Step program to be accepted amongst providers, the intervention has to be time efficient. Providers would be more willingly to adopt a new practice if it saves visit time. That time saved could be used for more detailed counseling if the

child's weight is worrisome. Members of the N.C. Medicaid network system are given incentives to be a network participant but must commit to network quality initiatives. Therefore, this intervention population will be more accepting of the intervention as part of fulfilling their responsibilities. The intervention requires providers to plot and interpret BMI calculations, but the nursing staff will actually calculate the measurement. Therefore, nursing acceptance is vital as well. Training sessions to teach nurses how to calculate BMI and to emphasize that BMI will become part of the vital signs is imperative. Nurses will likely accept this intervention because it should not increase intake time significantly given measuring height and weight is routine for most visits. To improve acceptability, physicians, mid-level providers, nurses, and office managers will be part of the intervention planning process.

Funding: The intervention will be part of the federal and state-funded N.C. Medicaid network system's continuous quality improvement budget.

Stakeholders: The biggest stakeholders will be both federal and state governments and Medicaid network providers. The DMA is a branch of the state government that receives funding from both federal and state budgets. Continued funding is the life-line of the intervention, so having the support of both governments is vital. Additionally, network providers have to support the program since they will be implementing it.

Administrative/Technical feasibility: The First Step program will be easily implemented from an administrative standpoint. Since the target population is already organized in a well-monitored network, most of the administrative necessities already exist. The goal of the program is to insert a non-burdensome qualitative improvement intervention into an already well-established system.

Challenges: The biggest challenge expected is ensuring the intervention is time efficient. Providers will not adopt the intervention if it increases time in their already time-restricted clinic visits. This consideration is why it is so important to have providers in the planning process. Another challenge will be intervention sustainability. Many of the clinics have routine protocols that will be changed. Changing behavior that has been practiced for a long time is difficult. The goal is to easily transition to new routine protocols that incorporate BMI as a vital sign. Having nurses on the planning committee will help with this potential obstacle as they normally are responsible for taking vital signs.

Goals and Objectives

The goal of the N.C. First Step program is to improve providers' recognition of overweight/obese children by increasing their use of the BMI measurement.

Short-term Objectives:

Objective 1: By month 5, recruit 5 physicians, 2 mid-level providers, 5 nurse managers, and 3 office managers in the Medicaid network system that serve pediatric patients to participate on the planning committee.

Strategy 1: Use DMA database to send out fliers to all network providers asking for volunteers. Fliers will outline program's major objectives, explain participation requirements, and describe participant's compensation of \$250. Physicians must receive permission from the medical director to have their clinic be a pilot intervention site if selected.

Strategy 2: Divide the state into 5 major regions: eastern N.C., triangle area, piedmont area, Mecklenburg County, and Western N.C. One physician and nurse

manager from each region must be represented. Mid-level providers and office managers can be from any region. Interested participants will be chosen by a lottery system.

Objective 2: By month 9, planning committee will identify which practice to pilot intervention and approve all intervention tools.

Strategy 1: Use DMA study data to identify region with most physician BMI recording non-compliance. Pilot intervention will be hosted by the clinic of the committee physician representing that region.

Strategy 2: Intervention BMI calculation wheel and BMI growth chart will be selected.

Strategy 3: Revised well-child templates will be developed. New templates will include in the vital sign section a space for BMI and weight classification.

Strategy 4: Parent reminder fliers will be developed.

Objective 3: By month 11, initiate pilot site intervention

Strategy 1: Train pilot site physicians and nurse supervisor

Strategy 2: Pilot site physician and nurse supervisor train other pilot site participants

Strategy 3: After 3 months, audit charts, analyze results of the pilot study, receive feedback from participants and improve intervention for network-wide distribution.

Objective 4: By month 18, intervention initiated network-wide

Strategy 1: Network clinics choose a physician and nurse manager project leader

Strategy 2: Planning committee staff will train participants on-site of new tools and protocols .

Objective 5: By month 24, the planning committee will analyze program effectiveness and collect feedback about intervention from 85% of physicians and nurses and 50% of parents.

Strategy 1: Chart audit by program committee assessing protocol compliance

Strategy 2: Physician, nurse, and parental survey issued asking opinions about intervention effectiveness, strengths and weaknesses.

Objective 6: By month 36, BMI and weight classification are being documented by providers in 80% of the pediatric charts.

Long-term Objectives:

Objective 1: By 3 years, BMI and weight classification are being documented by providers in 75% of pediatric charts.

Strategy 1: A maintenance program committee will periodically audit clinic charts and will send reminder emails to clinics with less than 70% of correctly documented charts.

Objective 2: By 7 years, all network clinics will have converted to EMR with BMI automatically calculated.

Logic Model

Resources/Inputs	Activities	Outputs	Short and Long-term Outcomes	Impact
<p>In order to accomplish our set of activities we will need the following:</p>	<p>In order to address our problem or asset we will conduct the following activities:</p>	<p>We expect that once completed or under way these activities will produce the following evidence of service delivery:</p>	<p>We expect that if completed or ongoing these activities will lead to the following changes in 1–3 then 4–6 years:</p>	<p>We expect that if completed these activities will lead to the following changes in 7–10 years</p>
<ul style="list-style-type: none"> - NC Medicaid data identifying networks without automatic BMI calculations and with the least pediatric BMI documentation - Relationship with Medicaid network providers - Easy-to-use BMI tools - New pediatric WCV template - Educational material from “Eat Smart, Move More” to develop parent flier - A pilot site - Federal and state legislation funding 	<ul style="list-style-type: none"> - Recruit Medicaid network physicians, mid-level providers, nurse managers and office managers to planning committee - Research and approve commercial BMI wheel and growth chart - Develop and receive approval from medical directors of revised WCV template - Develop and approve parent flier -Lobby for First Step program to be part of DMA budget 	<ul style="list-style-type: none"> - Planning committee staff provide on-site training for participating providers - BMI tools, templates, and fliers distributed and visible in clinics 	<p>Short-term:</p> <ul style="list-style-type: none"> - BMI will become part of a WCV vital sign - Providers will document and plot BMI in pediatric charts more frequently - Providers will classify weight status in children more frequently -More providers will follow weight assessment guidelines -Parents will become more active in child’s care and lifestyle choices <p>Long-term:</p> <ul style="list-style-type: none"> - Calculating BMI will be less burdensome to pediatric providers - More children with weight abnormalities will be identified early and treated 	<ul style="list-style-type: none"> - Early intervention for overweight/obese children - Decrease in childhood obesity prevalence in N.C. pediatric Medicaid patients - Improved lifestyle choices -Decrease in obesity related co-morbidities in children - Decrease in number of children developing into overweight/obese adults - Healthcare savings

Application of Program Theory

The First Step Program uses 2 community level theories: the organizational change stage theory and the diffusion of innovations theories. The organizational change stage theory illustrates how the program will pass through a series of steps as it develops. During the problem definition stage, a planning committee with program leaders, physicians, mid-level providers, nurse managers, and office managers will use DMA data to determine what networks are most delinquent in charting BMI. In conjunction, it will investigate, using DMA data, which networks have highest childhood obesity rates and investigate whether there is a correlation with poor documentation. The planning committee will also discuss barriers to implementation of the projected program intervention. Additionally, it will discuss the practicality of the intervention and funding sources.

During the initiation of action phase, the planning committee will decide on the easiest, most practical BMI calculation tool to use, develop a revised WCV template which includes a BMI and weight classification section, and create a flier for parents encouraging active involvement in their child's weight management.

The implementation of change phase will include program staff teaching network clinic staff new BMI protocols. These training sessions will occur during a one-hour DMA sponsored lunch. Additionally, BMI wheels, BMI charts, revised WCV templates, and parent fliers will be distributed and used within a week of on-site training.

After implementation, the intervention will be revised based on participant feedback and data analysis of its effectiveness. The First Step program will become part of the quality improvement requirements to which all Medicaid network providers must adhere. Periodically, First Step program staff will audit charts to monitor providers' compliance.

The diffusion of innovations theory perfectly fits the Medicaid network model. The highly-organized and well-monitored network system allows the intervention to be easily transmitted throughout participating clinics. Provider inconsistency with BMI recording has led to many children's weight problem being overlooked. The First Step program uses a checks-and-balances system to increase providers' BMI documentation and weight classification recognition. This systematic approach definitely has a relative advantage over current practice.

The First Step program recognizes the barriers, mainly time-restraint, hindering providers' consistent use of BMI. The intervention addresses an important topic without adding additional time to the WCV, thereby being compatible with providers' expectations. Furthermore, the easy-to-use BMI tools and protocols limit the interventions complexity. A pilot clinic site will initially test the intervention giving it trialability. Program managers will use pilot site feedback to make intervention improvements. Once a clinic has established the intervention, program managers will periodically audit charts for provider non-compliance and will request provider feedback. These tasks demonstrate the program's observability.

Implementation

The implementation of the First Step program begins with forming the planning committee. The core of the planning committee will all be current employees of the N.C. Division of Medicaid. Project supervisor is Dr. Brandy Peaker, family medicine and public health trained physician. Working alongside of her is project coordinator, David Smith, RN, and supporting staff members Angie Lumbick and Freida Summons. The core planning committee will develop recruitment fliers to distribute to all N.C. Medicaid network providers serving

Medicaid children ages 2-18. These providers include pediatricians, family medicine physicians, mid-level providers, nurse managers, and office managers. The core planning committee will divide the state into 5 major regions: eastern N.C., triangle area, piedmont area, Mecklenburg County, and Western N.C. One physician and nurse manager from each region must be represented. Mid-level providers and office managers can be from any region. Interested participants will be chosen by a lottery system for a total of 5 physicians, 2 mid-level providers, 5 nurse managers, and 3 office managers. All participants must meet in Raleigh for 4 planning committee meetings.

Once organized, the planning committee will use already collected N.C. DMA data to establish which region had the worst pediatric BMI documentation. This physician's clinic representing this region will become the pilot site for the intervention. Of note, physicians are required to receive approval of becoming a pilot site from their clinic's medical director before participating for the planning committee.

Next, the planning committee will discuss key barriers to providers failing to follow current BMI recommendations. Both evidence-based and anecdotal data will be used to decide the most effective BMI calculation wheel, BMI growth chart, and new protocols. BMI wheel and chart are aids to quickly and accurately calculate and plot BMI (Appendix 1 and 2). Using "Eat Smart, Move More" data, the planning committee will create a flier to be given to all parent at WCV discharge. The flier will include in large, colorful print, "Do you know your child's BMI?" It will also contain information explaining BMI and healthy lifestyle behaviors. Fliers will also be hung around the clinic in visible areas such as the waiting room, bathrooms, elevators, patient rooms. Finally, the planning committee will decide on the how best to revise

the WCV template to include area to record BMI and weight classification (Appendix 3). Final versions of revised template must be approved by all participating medical directors.

After finalizing materials and protocols, the planning committee providers will participate in a 2-hour training session, taught by the program coordinator, on how to operate new tools and protocols. The pilot site physician and nurse manager will then train pilot site physicians and staff on the new tools and protocols. Physicians and nurses will receive the same training so each will know the others responsibilities. This method creates and checks and balances system. Training will emphasize BMI should be regarded as a new vital sign. See Appendix 4 for detailed new BMI protocol. This appendix will be available at every nurse's station.

Three months into the pilot intervention, the program coordinator and staff will randomly audit charts at the pilot site looking for improved BMI documentation. Afterwards, the planning committee will analyze the data and discuss its effectiveness. If the pilot intervention is effective, the planning committee will receive feedback via survey from all pilot site participants (including parents). Based on responses, the planning committee will make necessary adjustments.

After finalization, the First Step intervention program will be introduced to all network clinics serving Medicaid pediatric patients as the newest network quality improvement initiative. Each clinic will be responsible for assigning a physician and nurse manager project leader to oversee implementation of the intervention into their clinic. Each clinic will have on-site training from one of the core planning committee members. For the first 3-6 months of implementation, core planning committee members will audit charts looking for improved BMI documentation. Reminder emails will be sent to project managers of clinics not documenting

BMI in 60% of WCV charts. Also, the planning committee will request feedback from participating providers every 3 months for the first year of the program.

First Step Program Timeline

Activity	Staff Involved	Due Dates
Formation of core planning committee (CPC)	Program supervisor, coordinator, and staff	1/09
Recruitment fliers distributed	CPC	2/09
Formation of provider planning committee (PPC)	CPC, physicians, mid-level providers, nurse managers, and office managers	5/09
Determine pilot site, approve all intervention tools, develop parent flier and revised WCV template	PPC	9/09
Approval of revised WCV template from all network medical directors	PPC, medical directors	11/09
Pilot site intervention	PPC, site providers	11/09 – 2/10
Pilot site feedback and intervention revisions	PPC	4/10
Network-wide implementation of intervention	PPC, network providers	6/10
Chart audits and participant feedback	CPC, providers, parents	1/11

Program Evaluation

I. Program Overview

Childhood obesity in the United States has reached record numbers. Increasing prevalence and development of premature co-morbidities like high blood pressure, type II diabetes, orthopedic problems, and low self-esteem, has made childhood obesity a national and state priority. Several studies suggest physicians' consistently underdiagnosing overweight/obese children is a major contributor to the worsening childhood obesity epidemic; undiagnosed children receive delayed or no treatment. The North Carolina First Step program recognizes that the first step in treating childhood obesity is correctly diagnosing it. This program is designed to improve healthcare provider's assessment of child and adolescent weight status, thereby triggering earlier interventions, if needed.

II. Approach to Evaluation

The primary purpose of this evaluation is to investigate whether the program reached its goal of improving providers' recognition of overweight/obese children by increasing their use of the BMI measurement. The evaluation will also investigate the feasibility of using these intervention tools in busy primary care settings. Finally, the evaluation will assess the potential for this program to be used statewide in practices serving both Medicaid and non-Medicaid children.

III. Evaluator Role

This evaluation will include both an internal and external evaluator. The internal evaluator was involved in the planning of the program and best understands the objectives and inner workings of the program. The external evaluator had no role in the program planning and thus will provide an unbiased, objective review of the program. This provides an opportunity to assure the program is understandable by those not involved in the planning process and thus can be easily transferable to other practices. Also, it allows for a more accurate evaluation as participants are more likely to give honest answers to questions posed by a non-stakeholder.

The evaluator must be willing to work with underserved populations, as the program's targeted population is Medicaid children. She must also be willing to work within the busy medical practice structure, which may include time limitations with the evaluation process.

IV. Stakeholder Input

Stakeholders in this evaluation include the program planning committee, Department of Medical Assistance (DMA), DMA network providers, and pediatric patients and their parents. The evaluator should elicit what stakeholders want to know from the evaluation before the evaluation is started. Stakeholders should also be involved with the evaluation process. The planning committee will be most heavily involved with the evaluation as they will provide the most insight to the inner-workings of the program. The state legislation, the main funding source of the program will be interested in the cost-effectiveness of the program, especially if the program will be considered for state-wide distribution. DMA network providers will be key in understanding the feasibility of the program in the clinical setting. The program will not

be supported by providers if it greatly disrupts an already busy, overcrowded practice. Finally, the patients and their parents are vital to program outcome evaluation and patient satisfaction.

V. Evaluation Study Design

This evaluation plans to use a single group pre and post test design. Because the intervention is being distributed to all providers in the DMA network system, a control group is not available. Therefore, a quasi-experimental could not be used. Also, the intervention was not randomly assigned to certain providers, eliminating the ability to do a randomized-control experimental design. Additionally, given the study only involves providers participating in Medicaid, its external validity to the state pediatric population is questionable. Although a direct causal relationship cannot be established, a single group pre/post test design can give a decent measurement of internal validity. The evaluation design will demonstrate whether the intervention had any influence on pediatric providers increasing BMI usage and better identifying overweight/obese children.

VI. Evaluation Methods

This evaluation will consist of both quantitative and qualitative data. The quantitative data includes 1,0000 random chart reviews assessing for changes in provider's BMI or weight status documentation after the intervention. Chart auditors will look for any documentation of a BMI or weight status classification within a year before program implementation. Then in the same chart, they will look for the same documentation at any point after program implementation. To be counted, BMI or weight status could be documented in any encounter excluding nurse or lab visits (i.e. well child visit, sick visit). The quantitative data will also measure differences

between BMI and weight status documentation in providers using paper charts versus electronic records, providers in different state regions, practice sizes, and providers usage of intervention tools provided (excluding posters). This information will be statistically measured using STATA.

Qualitative data will consist of open-ended surveys. All surveys and interviews will be distributed during the evaluation process and will include questions eliciting information before and after the intervention. Providers servicing the patients whose charts are audited will receive surveys asking them to rank the usefulness of the intervention tool, ease of use of tools, practicality in everyday clinical setting, compliance, likelihood of continued use of tools after the end of the program, and overall satisfaction. Also, patient's parents will be given surveys to evaluate the usefulness of information they received as a result of the intervention and overall satisfaction of the intervention.

VII. Evaluation Planning Tables

Short Term Objectives

Short Term Objective 1: By month 5, recruit 5 physicians, 2 mid-level providers, 5 nurse managers, and 3 office managers in the Medicaid network system that serve pediatric patients to participate on the planning committee.

Evaluation Questions	Participant	Evaluation Method
By month 5, were 5 physicians, 2 mid-level providers, 5 nurse managers, and 3 office managers recruited to participate in planning committee? If no, why not?	Program Coordinator	Open-ended interviews
Why did these providers want to participate?	Recruited providers*	Survey
How did the providers hear about the program?	Recruited providers	Survey
Did providers have any difficulty gaining permission to participate from medical director? If so, why?	Recruited providers	Survey

Were providers from each of the 5 NC regions represented? If no, why not?	Program Coordinator	Open-ended interview
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* Recruited providers will be referred to as the planning committee for the remainder of the document

Short term Objective 2: By month 9, planning committee will identify which practice to pilot intervention and approve all intervention tools.

Evaluation Questions	Participant	Evaluation Method
By month 9, was a pilot practice selected and were all intervention tools approved? If no, why not?	Planning committee	Open-ended interview
Were intervention tools able to be purchased with the amount of money allotted in the project budget? If no, how much over budget were the purchases?	Planning committee	Review intervention tool receipts

Short term Objective 3: By month 11, initiate pilot site intervention

Evaluation Questions	Participant	Evaluation Method
By month 11, was the pilot site initiated? If no, why not?	Planning committee	Open-ended interview
Was the pilot practice agreeable to piloting the intervention? If no, why not?	Planning committee; Pilot practice medical director	Open-ended interview
How were the pilot site lead provider and nursing supervisor trained about the intervention?	Planning committee, Pilot site lead provider and nursing supervisor	Open-ended interview
How were other providers and nursing staff trained about the intervention?	Planning committee; Pilot site providers and staff	Open-ended interview
Did any pilot staff need retraining? If so, why?	Planning committee	Open-ended interview
What percentage of patients had all intervention tools used?	Planning committee	Chart audit
What percentage of patients had no intervention tools used?	Planning committee	Chart audit
What percentage of patients had 50- 99% of intervention tools used?	Planning committee	Chart audit
What percentage of patients had 1-49% of intervention tools used?	Planning committee	Chart audit
What feedback was received from pilot clinic providers, staff, and patients/parents?	Pilot clinic providers, staff and parents	Survey

Based on chart audits and pilot site feedback, were changes made to the intervention?	Planning committee	Open-ended interview
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Short-term Objective 4: By month 18, intervention initiated network-wide

Evaluation Questions	Participant	Evaluation Method
By month 18, was the intervention initiated network-wide? If no, why not?	Planning Committee	Open-ended interview
Where there any barriers/difficulties training network participants? If so, what were they?	Planning Committee	Open-ended interview

Short-term Objective 5: By month 24, the planning committee will analyze program effectiveness and collect feedback about intervention from 85% of physicians and nurses and 50% of parents.

Evaluation Questions	Participant	Evaluation Method
By month 24, was data collected on the effectiveness of the intervention and feedback from 85% of physicians and nurses and 50% of parents? If no, why not?	Planning Committee	Open-ended interview
What percentage of patients had all intervention tools used?	Planning committee	Chart audit
What percentage of patients had no intervention tools used?	Planning committee	Chart audit
What percentage of patients had 50- 99% of intervention tools used?	Planning committee	Chart audit
What percentage of patients had 1-49% of intervention tools used?	Planning committee	Chart audit
What feedback was received from pilot clinic providers, staff, and patients/parents?	Pilot clinic providers, staff and parents	Survey

Short-term Objective 6: By month 36, BMI and weight classification are being documented by providers in 80% of the pediatric charts.

Evaluation Questions	Participant	Evaluation Method
By month 36, are BMI and weight classification being documented in 80% of charts? If no, why not?	Planning committee	Chart audit
Do there need to be any modifications to the intervention?	Planning committee	Open-ended interview

Long Term Objectives

Long term Objective 1: By 3 years, BMI and weight classification are being documented by providers in 75% of pediatric charts.

Evaluation Questions	Participant	Evaluation Method
By year 3, were BMI and weight classification being documented in at least 75% of charts? If no, why not?	Planning committee	Chart audit
Were reminder emails sent out to clinics with <70% of charts having BMI and weight classification documented? If no, why?	Planning committee	Open-ended interview
Did reminder emails increase compliance with the intervention?	Planning committee	Open-ended interview

Long-term Objective 2: By 7 years, all network clinics will have converted to EMR with BMI automatically calculated.

Evaluation Questions	Participant	Evaluation Method
By year 7, did all network clinics have EMR that automatically calculated BMI? If no, why, not?	Planning committee	Open-ended interview

VIII. Dissemination Plans

The evaluation will have important implications for future screening practices for childhood obesity. Therefore, given the current childhood obesity crisis, it is important to disseminate the evaluation extensively and promptly. A complete written report outlining all findings will be available for all stakeholders.

However, given major stakeholders, including state and federal officials and network providers, are extremely busy with competing priorities, a more simplified PowerPoint version will be available. The PowerPoint will be presented by the evaluator and program coordinator. All stakeholders and parents of children included in the intervention will be invited. Highlighted in the PowerPoint will be the changes between current practice and practice post-intervention in relation to BMI/weight status documentation. It will also illuminate how these changes have or

have not identified more overweight/obese children. Other important elements of the presentation will be providers' perception of the feasibility of continuing the intervention long-term and parent's perception of the usefulness of the intervention in their child's care. A question-and-answer and discussion period will occur after the presentation to address all concerns.

IX. IRB Summary

In addition to the IRB application, the following documents will be submitted to the committee:

- 1) All consent forms, including those given to parents of children participating in the intervention; fact or information sheets; verbal and phone consent scripts
- 2) HIPAA authorization addendum to consent form
- 3) All recruitment materials including scripts, flyers and advertising, letters, emails
- 4) All intervention tools used
- 5) Questionnaires, focus group guides, scripts for phone interviews
- 6) Grant application and supporting funds proposal

Discussion

The N.C. First Step program is an in-office intervention tool designed to aid clinicians in adhering to pediatric weight assessment guidelines. This improved recognition of overweight/obese children will lead to more effective obesity prevention and treatment. Many components of the program such as provider BMI toolkits containing BMI calculators and growth charts, and incorporating BMI into routine vital signs, are supported by the evidence as effective in-office interventions.

The First Step program has many strengths. Although the ultimate goal is for clinics to transition to automatically calculated BMI in EMR, this process can be daunting and take years to implement. The N.C. First Step program provides a more feasible intervention in the short-term to address the childhood obesity crisis immediately. The program plan's biggest strength is the emphasis on provider input with its development. Their influence helped design a program that easily fit into providers already established workflow and requires minimal training. These components cause little disruption to current practice, reducing a common barrier found in EMR implementation: provider resistance. The evaluation's biggest strength is its feasibility in a busy primary care clinic. Much of the evaluation relies on chart reviews which create little distraction in clinic daily activity.

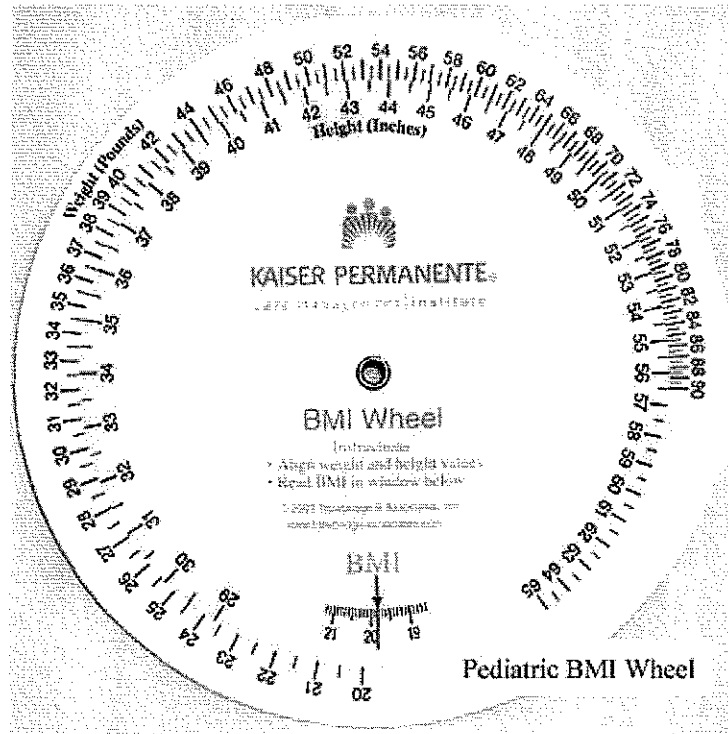
N.C. First Step has few limitations. One limitation is the evaluation measurement. With chart review being the primary measurement, the evaluation is dependent on provider documentation. Providers are notorious for poorly documenting health areas discussed in a visit. This oversight occurs often in WCVs where multiple health topics are discussed and when providers' time is limited. Despite the toolkit encouraging providers to document weight assessment, it is possible that the intervention prompted providers to screen for

overweight/obesity, but other barriers prevented them from documenting the results; the evaluation may be more of a reflection of provider documentation and not provider practice. Another limitation of the program is cost. Although, not as expensive as EMR implementation, the First Step program requires purchasing many new in-office materials.

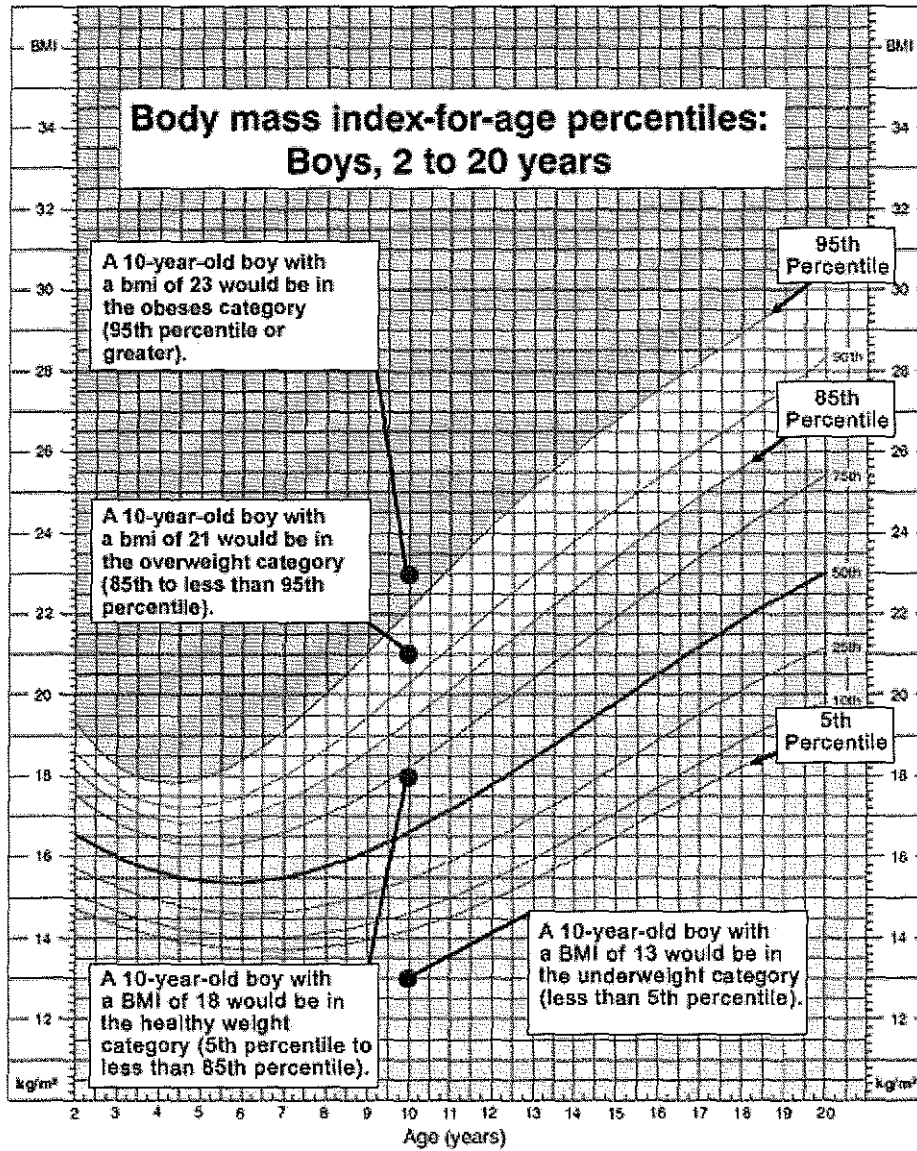
The N.C. First Step program uses several parts of the health visit to assess the child's weight status. In a checks-and-balances system, the nurse initiates the assessment, followed by physician or mid-level provider recognition, and ending with parent involvement. The hope is that with easy-to-use, time efficient tools and multiple measurement opportunities, calculating BMI will become less burdensome for pediatric providers. Childhood obesity is a catalyst to multiple poor health outcomes. Combating this disease starts with early diagnosis, which is why this intervention is aimed at helping providers take that first step.

Appendix 1.

Proposed BMI wheel



www.kpcmi.org/weight-management/bmiwheel.html



www.cdc.gov/.../about_childrens_BMI.html

Appendix 3.

Revised Well Child Visit Template Draft

Name _____ MRN _____ DOB _____

Vitals

Temp _____ HR _____ BP _____ Resp _____ Ht(in) _____ Wt (lbs) _____

BMI _____ kg/m²

- Weight Classification: underweight (BMI < 5th percentile)
 normal weight (BMI 5th - < 85th percentile)
 overweight (BMI 85th - > 95th percentile)
 obese (BMI ≥ 95th percentile)
 severely obese (BMI ≥ 99th percentile)

HPI

PMHx

FHx

Social

ROS

Anticipatory Guidance

Appendix 4.

New WCV BMI Protocol

Nurse

Greet patient → Vitals (including calculating BMI with wheel) → record and highlight BMI in designated area on new WCV template → insert into patient chart 1) BMI growth chart, if missing and 2) “Do you know your child’s BMI?” parent chart to physician or mid-level provider

Physician

See highlighted BMI on new WCV template → Plot BMI on growth chart → Check weight classification on revised WCV template → Discuss abnormalities with patient and parent → Provide parent with “Do you know your child’s BMI?” flier

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