Changes in Nurse Practitioners' Knowledge and Behaviors Following Brief Training on the Healthy Eating and Activity Together (HEAT) Guidelines

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ABSTRACT

Introduction: Primary care providers, particularly pediatric nurse practitioners, are an integral force involved in tackling the obesity epidemic among youth. The majority of nurse practitioners, however, report low proficiency regarding their ability to adequately prevent and treat pediatric overweight. In response, the National Association of Pediatric Nurse Practitioners (NAPNAP) developed the evidence-based Healthy Eating and Activity Together (HEAT) Clinical Practice Guideline (CPG) to improve provider behavior and efficacy.

Method: Thirty-five nurse practitioners attending the NAPNAP Annual Conference participated in an intensive 4-hour HEAT CPG training session. Pre-training and post-training data were collected on provider knowledge, practice behaviors, and barriers in relation to the prevention of overweight among youth.

Results: Post-training results revealed significant improvements in (a) practitioner knowledge (assessment of patient growth, family history, psychosocial functioning, nutrition, and physical activity); (b) practitioners' intent to improve behavior (i.e., increased intent to use behavior modification and counseling aimed at patient and family behavior change); and (c) practitioners' report of increased confidence in ability to address barriers.

Discussion: Study findings demonstrate preliminary support for the HEAT CPG as an effective tool aimed at helping providers to improve their ability to maintain patients' healthy weight. Future research is needed to verify the effects of HEAT CPG on long-term improvements in care. J Pediatr Health Care. (2009) *23*, 222-230.

Key words: Obesity prevention, clinical practice guidelines, provider training

Traditionally, the Centers for Disease Control and Prevention defined overweight youth as those greater than or equal to the 95th percentile; those higher than the 85th percentile but less than the 95th percentile were referred to as

being at risk for overweight. Based on these definitions, the prevalence of overweight children nearly quadrupled from 1966 to 2004 (Ogden et al., 2006). Studies suggest that primary care providers feel unprepared to address the complex issue of overweight children (Scott et al., 2004). Subsequently, the National Association of Pediatric Nurse Practitioners (NAPNAP) convened a nationwide group of experts to review the evidence and develop the Healthy Eating and Activity Together (HEAT) Clinical Practice Guideline (CPG): Identifying and Preventing Overweight in Childhood, which is aimed at the prevention of overweight in children. This evidence-based CPG has been published in a special supplement to the *Journal of Pediatric Health Care* (NAPNAP, 2006) and disseminated widely via inclusion in the Agency for Healthcare Research and Quality's National Guidelines Clearinghouse at www.guidelines.gov. However, historically, research suggests that development and dissemination of guidelines does not change provider behavior (Bauer, 2002; Cabana et al., 1999; Mabry et al., 2005). Therefore, it is crucial that effective training programs be identified to provide primary care providers with the latest evidence on successful prevention strategies for overweight in children. A 4-hour training session on implementing the HEAT CPG in practice settings was offered at the Annual NAPNAP Conference in spring 2006. The purpose of this study was to evaluate the impact of HEAT CPG training on participants' knowledge, intent to modify provider behaviors, and confidence in ability to address the barriers regarding the care for children at risk for being overweight.

BACKGROUND

National surveys have documented an increase in overweight children during the past four decades, especially in ethnic minority youth, with 16.3% of White children, 20% of non-Hispanic Black children, and 19.2% of Mexican American children overweight in 2003-2004 compared with 11% White, 18.8% non-Hispanic Black, and 20.2% Mexican American children in 1999-2000 (Ogden et al., 2006). Recently, the American Medical Association (AMA) Expert Committee Recommendations Regarding the Prevention, Assessment, and Treatment of Child and Adolescent Overweight and Obesity recommended changes in the terminology for children between the ages of 2 to 18 years, with a body mass index (BMI) greater than or equal to the 85th percentile but less than the 95th percentile for age and sex now defined as overweight and children with a BMI greater than or equal to the 95th percentile for age and sex now defined as obese (Barlow & the AMA Expert Committee, 2007). Data suggest that obese children become obese adults (Must, 2003). This obesity epidemic is leading to treatment of expensive, lifelong chronic illnesses such as hypertension, type 2 diabetes, musculoskeletal problems, respiratory problems, and emotional problems, including social anxiety, poor self-esteem, and depression (Buddeberg-Fischer, Klaghofer, & Reed, 1999; Must, 2003; Must et al., 1999; Strauss & Pollack, 2003). Direct and indirect medical costs of obesity in the United States were estimated at $92.6 billion in 2002 (Finkelstein, Fiebelkorn, & Wang, 2005). Reversing this trend toward treating lifelong, expensive chronic illnesses requires the adoption of effective prevention strategies by primary care providers. The prevention efforts must include primary care and strategies for nurse practitioners (NPs) to advocate for changes in the community to promote a healthier environment. In addition, addressing the ethnic disparities with the increased prevalence of obesity and related sequelae among minority populations requires culturally appropriate interventions.

According to Pearson (2007), 139,520 NPs are practicing in the United States. Sixty-six percent of NPs practice in primary care settings. Many NPs work with poor, underserved, ethnic minority populations, which are the groups most at risk for the development of obesity and the related health complications. However, providers are reporting feelings of uncertainty in dealing with the problem of childhood obesity (Scott et al., 2004). In addition, a recent survey indicated that NPs wanted clinical practice guidelines for assessing and addressing youth at risk for overweight and obesity (Anderson-Gifford & Small, 2006).

Surveys suggest that during an average 15-minute visit, primary care providers devote approximately 31.7 seconds to nutrition counseling, 6.4 seconds discussing the child's growth, and 1.6 seconds to exercise counseling (Goldstein, Dworkin, & Bernstein, 1999). One study found that approximately 50% of pediatricians reported they do not counsel on weight or physical activity (Galuska et al., 2003). Even fewer providers, only 25% of pediatricians, pediatric NPs (PNPs) and registered dieticians, reported including all elements of the evaluation (family history, medical history, activity and nutritional history, physical examination, and laboratory assessments) for children at risk for being overweight (Barlow, Dietz, Klish, & Trowbridge, 2002).

Mabry and colleagues (2005) reported that despite consensus guidelines recommending the use of BMI for the diagnosis and management of obesity, BMI was documented in only 5% of initial visits for children diagnosed with obesity during a routine well-child visit in a general pediatric practice. More recently, Cook and colleagues (2005) reported that in a study examining records of nearly 33,000 well-child visits, obesity was

diagnosed 0.78% of the time in all outpatient visits and 0.93% of the time during well-child visits. This number is remarkably low considering the high prevalence of obesity in youth and suggests that clinicians may be overlooking obesity during routine office visits, thus missing an opportunity to intervene. Furthermore, Cook and associates reported that blood pressure was documented only in 43.9% of the well-child visits, and diet and exercise counseling rates were reported as 35.7% and 18.6%, respectively, for those without a diagnosis of overweight.

Pediatric providers, including PNPs, reported low proficiency in counseling families on behavioral management, eating practices, changing sedentary behaviors, guidance in parenting, and addressing the degree of overweight (Story et al., 2002). A systematic review by Harvey, Glenny, Kirk, and Summerbell (2002) on improving obesity management by adult providers, including nurses, suggested that reminder systems, brief training sessions, shared care by interdisciplinary teams, inpatient care for morbidly obese clients, and dietician-led care were worthy of further investigation. Additionally, pediatric providers' assessment of overweight youth with the team approach to quality improvement and a decrease in BMI has been reported after provider training on brief motivational interviewing (Gee, Mirkin, Howell, & Eckroad, 2006). However, research on education and training strategies to improve pediatric providers' use of evidence-based interventions and improve care to promote healthy weight in children has not been investigated thoroughly.

Creation of the NAPNAP HEAT CPG: Identifying and Preventing Overweight in Childhood

Under the leadership of Past President Mary Margaret Gottesman, PhD, RN, CPNP, NAPNAP convened a group of experts from across the United States to review the evidence and develop the HEAT CPG, aimed at the prevention of overweight in children. NAPNAP recognized that despite the great deal of research conducted since the 1998 Expert Panel Recommendations (Barlow & Dietz, 1998), the obesity epidemic was getting worse. In addition, NAPNAP acknowledged that the traditional prescriptive approach was not working to treat this epidemic. A developmental, culturally sensitive, and family-centered approach was needed to guide practitioners in promoting healthy weight in children. A complete description of the CPG and the process for the development of the guideline by the expert panel was previously published in a March/April 2006 supplement to the Journal (NAPNAP, 2006).

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The evidence-based, culturally sensitive, age-specific guideline was released for NAPNAP's 6000+ members with family-centered recommendations that recognize that children and families have strengths that will facilitate their acquiring healthier behaviors. The guideline also is relationship focused, using techniques such as motivational interviewing to help the providers collaborate and support families in adopting healthier nutrition and activity patterns.

NAPNAP recognized that past research regarding the use of evidence-based CPGs suggests that publishing guidelines does not change provider behavior. Studies have shown widespread failure to follow established guidelines for a variety of conditions (Bauer, 2002; Mabry et al., 2005). Therefore, evidence-based training strategies are needed to help primary care providers prevent overweight in children, especially in ethnic minority families most at risk for the development of these costly chronic illnesses. To promote the adoption of the evidence-based HEAT CPG, the HEAT work groups developed an intensive training program for providers on the use of the CPG in the prevention of childhood overweight. The purpose of this study was to evaluate the effectiveness of the HEAT CPG training on the practitioners' knowledge, intent to change provider behaviors, and barriers to

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the prevention of overweight in infants and toddlers, preschool and school-aged children, and adolescents.

METHOD

Design

A quasi-experimental, one-group, pre-post test design was used to evaluate change in knowledge, intent to change practice behaviors, and perceptions of barriers to behavior change.

Sample

A convenience sample of 35 of the 37 NPs who attended the NAPNAP Annual Conference and registered for the HEAT CPG intensive workshop volunteered for the study. Workshop volunteers were told that completion of the survey was implied consent. Thirty-two workshop participants completed both the pre-test and post-test evaluation. Power analyses were not conducted prior to the study.

Measures

The instrument adapted for this study was originally developed by the 1998 Expert Panel on Obesity Prevention in Children and the International Life Sciences Institute (Trowbridge, Sofka, Holt, & Barlow, 2002) as a needs assessment tool for obtaining information on providers' knowledge, current practice behaviors, planned practice behaviors, and perceived barriers in relation to the prevention of overweight in children and adolescents. The original instrument consisted of 35 questions (a total of 164 items) divided among three topic areas: knowledge, practice behaviors, and barriers. The adapted instrument was shortened to 17 questions (for a total of 85 items) to reduce respondent burden and focus on presentation of overweight children. Deleted items included providers' opinions about obesity, providers' sources of information, who obtained the diet history and how it was obtained, and treatment, along with referral sections, because CPGs focused on prevention. The assessment of provider weight and diet also were eliminated in the revised instrument. The measures retained were grouped around three central themes: practitioners' knowledge, practitioners' behaviors, and barriers to effective prevention of overweight.

Practitioners' Knowledge Regarding Obesity Prevention

The 34 items within this domain encompassed practitioners' knowledge about assessment of growth, family history, psychosocial conditions, physical activity, and definition for at risk for overweight (now overweight per AMA recommendations) as BMI greater than or equal to the 85th percentile and less than the 95th percentile; and overweight (now obese per AMA recommendations) as BMI greater than or equal to the 95th percentile. Except for the items on definitions of overweight, all items were scored on a 5-point Likert scale: 0 = never, 1 = rarely, 2 = sometimes, 3 = often, and 4 = most of the time. The methods for determining risk of overweight/overweight items were coded as: 0 = never use it, 1 = use for designating overweight ≥95th percentile, 2 = use for designating at risk of overweight ≥85th percentile and <95th percentile. For each item, a dichotomous variable was created to indicate adherence to the guidelines (0 = nonadherent, 1 = adherent). Aggregate variables then were created that represented the average proportion of time the practitioner was adherent to the guidelines (pre-test) or reported intentions to be adherent (at post-test) over all items for that construct.

Practice Behaviors

Behavior modification and family counseling. Practitioners were asked to evaluate their own proficiency (i.e., 0 = low, 1 = moderate, 2 = high) regarding a variety of practice behaviors (N = 11; use of behavior modification strategies, modification of diet, modification of physical activity, modification of sedentary behavior, guidance in parenting, addressing family conflict, assessment of growth patterns, cultural sensitivity, use of motivational interviewing, use of rapid cycle change for quality improvement, and advocacy strategies for families to improve resources) used in the prevention of overweight in infants, children, and adolescents prior to the training. Following training, practitioners were asked how well prepared they were to use these skills. Prior factor analyses among this sample of 35 PNPs revealed that these items clustered into four variables: behavior modification skills; counseling skills regarding parenting techniques, family conflict, and behavior change; advocacy for linking families with resources; and cultural sensitivity (Sidora-Arcoleo, 2008). An average score was computed for behavior modification skills and counseling skills, with higher scores indicating greater confidence in practice behaviors.

Family collaboration and advising. Practitioners were asked who they engaged in their discussions about nutrition and physical activity during their office visits, and after training, who they planned to engage in discussions (Table 1). This question was asked separately for preschool-aged children, school-aged children, and adolescents. Response choices were: 1 = patient alone, 2 = patient and parents, and 3 = patient, parents, and other household members. Items coded 3 were considered adherent to the guidelines. The average proportion of time adherent was computed across the three age groups. In addition, practitioners were asked about making specific age-appropriate recommendations regarding nutrition (e.g., changes in eating pattern, limitations of specific foods, low-fat diet, portion control, limiting fast foods, making healthier

TABLE 1. Practice behaviors: family collaboration and advising families*

	Mean (SD) pre-test	Mean (SD) post-test	Mean difference (SD)	*t* value	*P* value
Family collaborators	22.55 (40.80)	58.06 (48.66)	34.44 (49.89)	3.78	.0007
Nutritional recommendations					
Preschool	89.37 (19.12)	97.53 (6.03)	4.23 (8.95)	2.36	.0266
School-aged	91.11 (12.14)	99.36 (2.26)	6.36 (10.57)	3.01	.0061
Adolescents	91.16 (10.99)	99.36 (2.26)	7.04 (8.53)	4.21	.0003
Physical activity recommendations					
Preschool	84.09 (15.79)	98.26 (6.01)	11.60 (16.69)	3.40	.0024
School-aged	93.43 (10.98)	100.00 (0.00)	5.56 (10.62)	2.56	.0174
Adolescents	91.90 (10.97)	100.00 (0.00)	7.69 (10.78)	3.64	.0012

**Mean scores represent percentage who reported making appropriate recommendations in these areas.*

choices when eating outside the home, increased consumption of fruits and vegetables, having family meals together, no television during meal time, avoiding use of food as a reward, limiting fruit juice, and drinking water instead of juice or soda pop), and physical activity (e.g., increase in organized activity, increase in unstructured physical activity or free play, increase in routine activity, decrease in sedentary behavior, no television in the bedroom, and getting 8 hours of sleep per night). Responses were "never," "sometimes," and "often" for each age group. An average score was computed for making age-appropriate recommendations.

Barriers

There were seven items representing barriers to effective prevention of overweight in children. These barriers were lack of patient motivation, lack of parent involvement in treatment, lack of clinician time, lack of reimbursement, lack of clinician knowledge about treatment, lack of treatment skills, and lack of support services (e.g., nutrition and counseling). On the pre-test, practitioners were asked to indicate how often each item was a barrier for them, using the following response scale (0 = never, 1 = rarely, 2 = sometimes, 3 = often, and 4 = most of the time). The post-test survey asked the participants how well the training prepared them to reduce these barriers to prevention of overweight in children using the same response scale. Previous factor analyses yielded three conceptual variables: health care system barriers, parent barriers, and a single item representing lack of support services (Sidora-Arcoleo, 2008). An average frequency score was computed for the health care system and parent barrier items.

PROCEDURE

Approval was obtained for the study from the Arizona State University Institutional Review Board. NPs attending the NAPNAP Annual Conference who registered for the HEAT CPG intensive workshop were asked to complete a pre-test survey at the beginning of the workshop and a post-test survey at the completion of the training session.

The 4-hour training session included an overview of the development of the HEAT CPG and a summary of the specific recommendations for infants, early childhood, school-aged, and teens. Participants received training on motivational interviewing and a demonstration of the counseling technique. The importance of cultural sensitivity and the role of the NP in advocating for youth at risk for obesity also were included in the presentation, along with an overview of the tools available in the HEAT Resource Kit (i.e., documentation guide, parent/patient handouts, and rapid cycle improvement worksheets). Participants were given some case studies to role play at their individual tables using the new information, techniques, and tools in the resource kit.

ANALYSIS PLAN

Descriptive statistics were run for all variables. Independent sample *t* tests were used to test continuous outcomes, whereas χ^2 tests were used to test categorical outcomes. The α coefficient was set at .05. All analyses were conducted using SAS version 9.1. Using the recommendations identified for practice, evaluation, and intervention by the Expert Panel (HEAT CPGs), variables representing the percentage of time compliant with these expert panel recommendations were created pre-test and post-test for the knowledge of assessment of overweight and practice behaviors regarding nutrition and activity counseling.

RESULTS

Thirty-five participants completed the surveys. Eighty-nine percent (n = 31) of participants reported working in pediatrics, and there was one participant in each of the following specialties: family practice, endocrinology, ear/nose/throat, and pediatric and adolescent diabetes. Most of the participants (85%, n = 30) had been in practice more than 5 years, 9% (n = 3) were in practice 3 to 5 years, 3% (n = 1) had been in practice 1 to

TABLE 2. Knowledge regarding obesity prevention*

Category	Pre-test mean (SD) %	Post-test mean (SD)	Difference mean (SD)	t	P
		% Adherence with recommendations			
Assessment of growth	52.30 (15.95)	64.87 (5.81)	13.00 (14.30)	5.06	<.0001
Define overweight	55.48 (16.41)	53.23 (14.06)	−0.54 (17.47)	−.017	.87
Assessment of family history	68.75 (21.81)	97.18 (9.53)	30.42 (21.70)	7.68	<.0001
Psychosocial, emotional, and behavioral assessment	75.45 (26.75)	78.36 (27.24)	1.37 (6.17)	1.21	.23
Physical activity assessment	61.03 (28.33)	100.00 (0.00)	40.00 (29.80)	7.35	<.0001

**Mean scores represent percentage of participants who reported knowledge of these areas.*

3 years, and 3% (n = 1) had been in practice for a year or less. Less than half (43%) reported having a personal digital assistant (PDA), and 69% reported interest in having guideline available for use with a PDA. In addition, more than half of participants (54%; n = 19) reported that they did not have a computer for tracking data for quality improvement. Practitioners who participated in the HEAT CPG training reported post-test improvements in knowledge and strategies to address the barriers to the prevention of overweight in youth, as well as increased intent to change practice behaviors.

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Practitioners' Knowledge Regarding Obesity Prevention

The survey findings suggest that the HEAT CPG intensive workshop resulted in significant changes in practitioners' knowledge in a variety of areas related to assessment of growth, accurate definition of overweight, assessment of family history related to risks for overweight, psychosocial assessment, and physical activity assessment (Table 2). Significant improvements in intent to conduct growth assessment (t = 5.06, P < .0001), assessment of family history (t = 7.68, P < .0001), and physical activity assessment (t = 7.35, P < .0001) were reported after the training. The practitioners reported significant improvements (52% of NPs at pre-test and 65% of NPs at post-test) in their plans to assess growth using BMI percentile, change in weight velocity (crossing percentiles), weight for length percentile for children younger than 2 years, and blood pressure percentile. Unfortunately, there was not a significant change in practitioners' knowledge to define overweight in youth (P = .87). The number of practitioners correctly reporting parameters for defining overweight (i.e., BMI ≥95%) decreased from approximately 55% at pre-test to 53% at post-test (Table 2).

Significant improvements (t = 7.68, P < .0001) were made in knowledge regarding the appropriate components of the family health history related to risk for overweight, with 69% of participants reporting accurate components at the pre-test and 97% reporting at post-test. Relevant family history included family history of overweight, dyslipidemia, hypertension, cardiovascular disease, gall bladder disease, eating disorders, diabetes mellitus, and other endocrine abnormalities. However, there were no improvements in plans to conduct psychosocial assessment after the training (P = .23). Seventy-five percent of practitioners reported that they completed an accurate psychosocial assessment at pre-test, while 78% reported increased knowledge regarding how to complete a psychosocial assessment for children at risk for overweight. Specifically, the psychosocial assessment addressed assessing factors such as depression, poor self-esteem, and concern about weight that put individuals at risk for being overweight (Table 2).

Practitioners' intent to conduct assessment of physical activity improved considerably after training (t = 7.35, P < .0001). At pre-test, 61% of practitioners asked about daily activity (i.e., amount of physical activity, routine activities, time spent being sedentary, etc.) during well-child visits; however, 100% of participants indicated the importance of collecting this information following the workshop (Table 2).

Practitioners were asked if they consistently obtained a structured diet history during well-child visits. At pre-test, 92% of practitioners responded that they consistently obtained this structured history; 96% reported at post-test that they planned to in the future (χ^2 = 12.48, P = .0004).

Practice Behaviors

The changes regarding providers' perception of how well prepared they felt regarding practice

behaviors after training are outlined below, including impact of training on practitioners' confidence in using behavior modification and counseling skills, growth assessment, cultural sensitivity, and advocacy. The impact of the HEAT training on practitioners' intentions to collaborate with families and make age-appropriate recommendations regarding nutrition and physical activity was assessed.

Behavior modification and family counseling skills. On average, participants reported "moderate" (M = 1.69, SD = .44) proficiency in behavior modification techniques and counseling at pre-test. Post-training data suggest a significant improvement ($P < .0001$) in participants' reporting "high" (M = 2.43, SD = .50) levels of confidence in behavioral modification skills to modify diet/eating patterns, physical activity, and sedentary behavior in patients. Likewise, significant improvement ($P < .0001$) in practitioner counseling addressing parenting techniques, family conflict, and engaging families in behavior change was reported. On average, perceived counseling confidence in ability increased from "moderate" (M = 1.81, SD = .43) at pre-test to "high" (M = 2.43, SD = .45) after training (Table 3).

TABLE 3. Practice behaviors: behavior modification and family counseling skills

	Pretest mean (SD)	Posttest mean (SD)	Difference mean (SD)	*t* value	*P* value
Skills					
Behavior modification	1.69 (.44)	2.43 (.50)	.78 (.71)	6.18	<.0001
Counseling	1.81 (.43)	2.43 (.45)	.63 (.69)	5.11	<.0001

TABLE 4. Practice behaviors: growth assessment, cultural sensitivity, and advocacy

	% Low	% Moderate	% High	χ^2	*P*
Growth assessment					
Pre-test	3.5	27.6	68.9	0.44	.80
Post-test	0	17.2	82.8		
Cultural sensitivity					
Pre-test	41.4	48.3	10.3	.83	.93
Post-test	6.9	34.5	58.6		
Advocacy					
Pre-test	70.0	30.0	0	1.38	.50
Post-test	6.7	60.0	33.3		

Values for self-confidence assessment scale ratings are 0 = low, 1 = moderate, 2 = high.

Confidence in growth assessment, cultural sensitivity, and advocacy. Table 3 presents the results of the χ^2 analyses for pre-test and post-test scores for practitioners' confidence in growth assessment, cultural sensitivity, and advocacy for families. While the χ^2 analysis did not reveal statistically significant differences, there were clinically meaningful shifts toward practitioners reporting higher perceived proficiency levels after workshop participation. The percentage of participants reporting high proficiency in assessing growth patterns increased from 68.9% pre-test to 82.8% post-test. High proficiency ratings for cultural sensitivity increased from 10% to 59%, and similar changes occurred in the reports of proficiency in providing advocacy strategies to families, where no practitioners reported high proficiency prior to training and 33% reported increased confidence after the training (Table 4). A larger sample size was needed to fully evaluate this area.

Family collaboration and advising. Significant differences were found in the plan to routinely engage the whole family in the discussion of healthy nutrition and physical activity before and after the training on the HEAT CPG (P = .0007). At pre-test, 23% of practitioners reported routinely engaging patient, parent, and other household family members in the discussion of healthy practices, whereas after the workshop, 58% reported a plan to collaborate with the entire family. In addition, significant changes in plans for age-appropriate recommendations regarding nutrition and physical activity were reported (Table 1).

Nutrition recommendations. Significant improvements were made in practitioner knowledge of appropriate nutrition recommendations for preschool-aged children (P = .0266), school-aged children (P = .0061), and adolescents (P = .0003) after the training. Findings indicate that 89% of participants were making appropriate recommendations regarding topics such as portion control, respecting hunger cues, and avoiding certain foods during nutritional counseling for preschool-aged children; 91% of practitioners were doing so for school-aged children and adolescents. Results showed an improvement for all age groups, as participants' intentions regarding age-appropriate nutritional counseling recommendations improved to 98% for preschool-aged children and 99% for the older groups at post-test (Table 1).

Physical activity recommendations. Assessment of practitioners' intentions regarding recommendations for physical activity among preschool-aged and school-aged children and adolescents included increasing organized activities, encouraging free play and routine activities, decreasing sedentary behavior, not having a television

in their bedroom, and getting at least 8 hours of sleep each night. Practitioners reported significant differences in intentions to recommend age-appropriate physical activity for preschool-aged children (P = .0024), school-aged children (P = .0174), and adolescents (P = .0012). Specifically, data indicated that participants' intentions to recommend age-appropriate physical activity for preschoolers increased from 84% of participants to 98%. Improvements in intent regarding counseling school-aged children (93% at pre-test) and adolescents (92% at pre-test) were evident, as 100% of practitioners addressed the appropriate issues regarding physical activity at post-test. (Table 1)

Barriers to Effective Prevention of Overweight

Practitioners were asked to rank the barriers to prevention of overweight in children on the pre-test, using the following response scale (0 = never, 1 = rarely, 2 = sometimes, 3 = often, and 4 = most of the time). The post-test survey asked the participants how well the training prepared them to reduce the barriers to prevention of overweight in children. Participants reported that significant barriers existed and that the training provided them with strategies to address the barriers. The barriers to the prevention of overweight in infants, preschool-aged and school-aged children, and adolescents identified by NPs were parents, health care systems, and support services. Practitioners reported that parent barriers, including lack of patient motivation and lack of parental involvement in treatment, were identified as barriers to prevention of obesity "often" (M = 2.93, SD = .54). However, post-test data indicated that the majority of participants reported that the workshop addressed strategies that would help to reduce parent barriers in prevention of childhood overweight (M = 3.44, SD = .58). Similarly, health care barriers, including lack of clinician time, reimbursement, knowledge about treatment, and treatment skills, also were identified as barriers to overweight prevention as either "sometimes" or "often" (M = 2.40, SD = .78) by participants at pre-test. Again, post-tests revealed that most participants (M = 2.94, SD = .87) believed the workshop helped in learning strategies to reduce health care barriers. Participants, likewise, identified lack of support services, such as counseling and nutrition, as barriers to overweight prevention "often" (M = 2.86, SD = .73) at pre-test. Post-test scores either "sometimes" or "often" (M = 2.43, SD = 1.30) indicated that the training provided strategies to improve their ability to address the lack of support services.

More than half of the practitioners surveyed reported that they did not have a computer for tracking data for quality improvement, which has important implications for future work.

DISCUSSION

The HEAT CPG was developed as a resource to guide NPs in the accurate identification and assessment of overweight status in children, as well as in counseling for maintaining healthy weights. Previous research suggests that providers were not identifying, assessing, and addressing overweight in youth. Furthermore, research suggests that the development and dissemination of CPGs does not change provider behavior; therefore, the HEAT Steering Work Group, along with the Research and Education Work Groups, developed training to facilitate the implementation of the HEAT CPG. Training on the use of the HEAT CPG was assessed to evaluate the impact on providers' knowledge, practice behaviors, and barriers to overweight prevention.

The findings suggest that the practitioners who attended the HEAT CPG training significantly increased their knowledge of identification and assessment of overweight children. The pre-test surveys reported that only half of the NPs were proficient in the assessment of growth patterns and the degree of overweight. After training with the HEAT CPG, significantly more of the practitioners reported plans to include accurate parameters for assessing growth in children and assessing all components of a family medical history. In addition, practitioners reported that they plan to evaluate psychosocial factors when evaluating growth in children. After the training, practitioners reported plans for improvement in practice behaviors, including use of behavior modification and counseling skills; confidence in growth assessment, cultural sensitivity, and advocacy; and age-appropriate physical activity and nutrition recommendations. Findings from this study suggest that training on the HEAT CPG significantly improves the practitioners' knowledge, intention to change practice behaviors, and strategies for addressing the barriers to the prevention of childhood overweight. Thus the findings suggest that the NPs' use of the HEAT CPG has the potential to improve the care of children focused on the prevention of childhood overweight. Further research is needed to evaluate if the training had an impact on provider behavior and patient outcomes. In addition, the findings suggested that approximately 69% of NPs were

interested in having the guideline available for use with a PDA. More than half of the practitioners surveyed reported that they did not have a computer for tracking data for quality improvement, which has important implications for future work.

Strengths and Limitations

This study has several strengths and limitations. Although many groups are developing and publishing guidelines for the prevention of childhood overweight, there is limited evidence on effective ways to promote their adoption or on the best way to train providers on their use. This study presented findings on the impact of training on the use of the guideline for NPs.

The strengths of the study include the recruitment of providers from a nationally representative sample from across the United States. Although our sample was small and may have limited ability to detect statistically significant differences, significant improvement did occur in multiple areas.

A larger sample size would have allowed for a more thorough evaluation of the practice behaviors, growth assessment, culturally sensitive care, and advocacy. We also recognize the limitations of self-report survey data and the further limitation of the post-test questions asking participants how well the training prepared them and their intention to change practice behaviors. The study did not include a long-term follow-up of practitioner knowledge after training. In addition, the study did not assess the impact of training on the practitioner behavior or patient outcomes. Addressing these issues are the goals of the HEAT Steering Work Group's ongoing work.

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