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Best Practices in the Management of Pediatric Obesity in Primary Care Clinics

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BEST PRACTICES IN THE MANAGEMENT OF PEDIATRIC OBESITY IN PRIMARY CARE CLINICS

by

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DEDICATION

I am would like to dedicate this work to my family and in particular my husband, Steve, and my children, Elizabeth and Will. They have been patient and supportive of me throughout this endeavor. My family and friends have been a constant source of encouragement and I feel like I share this degree with all of them. My fervent desire is that this experience has helped me to grow, not only as a nurse, but also as a teacher and Christian. I have learned that through faith, all things are possible.

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ABSTRACT

Obesity prevalence among children and adolescents has nearly tripled since 1980. Children and adolescents are at risk for developing the comorbidities seen in obese and overweight adults such as hypertension, type 2 diabetes, and sleep apnea. Traditional treatment for obese and overweight children involved counseling children and their families. Current recommendations include a comprehensive staged approach to weight management that includes prevention plus structured weight management, comprehensive multidisciplinary intervention and tertiary care intervention. Unfortunately structured weight management programs have not been widely available, leaving the primary provider with limited options.

The purpose of this project was to analyze the literature to determine evidence-based approaches in the management and treatment of pediatric obesity in primary care. Evidence was evaluated and recommendations for the management of obese children and adolescents were proposed.

PREFACE

The mission of the University of South Carolina's College of Nursing is to "develop competent, caring nurse leaders to advance the profession of nursing through the integration of teaching, research, and service to improve client health and well-being outcomes" (Office of Academic Affairs, n.d., p. 1). In order to fulfill the mission, students enrolled in the DNP program must complete an Evidence-based Practice project. The Evidence-based Practice project allows the student to identify an area of concern, review literature pertaining to the area of concern, and analyze the literature. Students then derive guidelines based on the literature. The intent of this particular project is to bring awareness to the obesity epidemic in the pediatric population and provide evidence that will serve as a foundation for additional research in the treatment and management of pediatric obesity.

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List of Abbreviations

AAP ..... American Academy of Pediatrics

AHRQ .....Agency for Healthcare Quality and Research

AMA ..... American Medical Association

ADA……..American Dietetic Association

BMI ..... Body Mass Index

CDC ..... Centers for Disease Control and Prevention

CE .....Consistent Evidence

ME..... Mixed Evidence

NHANES .....National Health and Nutrition Examination Survey

RTC..... Randomized Control Trial

PNP .....Pediatric Nurse Practitioner

PCP……..……Primary Care Provider

SDS…… ..... ……Standard Deviation Score

SIGN ..... Scottish Intercollegiate Guidelines Network

SSB .....Sugar Sweetened Beverage

USPSTF .....US Preventive Services Task Force

CHAPTER 1

INTRODUCTION

Obesity and the complications that arise from it carry not only a physical burden for the child but also impact emotional development and social wellbeing. According to data from the Centers for Disease Control and Prevention (2011b), obesity in children and adolescents has nearly tripled since 1980. Ogden and Carroll (2010) noted that approximately 17% (or 12.5 million) of children and adolescents aged 2-19 years were obese. The prevalence of obesity has increased in all the age groups. The most recent data noted that in children aged 6-11 obesity increased to 19.6% and in the 12-19 year range obesity increased to 18.1% (Ogden & Carroll, 2010). Differences in obesity prevalence among children and adolescents were noted among the different races and ethnicities for boys and girls in the United States. Non-Hispanic black adolescent girls had the highest prevalence of obesity with 29.2 % and Mexican American boys were next with 26.8% (Ogden & Carroll, 2010).

Consequences of Obesity

Childhood obesity can lead to serious physical and emotional consequences. The following section details the physical and psychosocial consequences that can occur and can impact health into adulthood.

Physical consequences.

Obesity has long term consequences in children such as hypertension and

hyperlipidemia, increased risk of insulin resistance and type 2 diabetes, musculoskeletal problems, fatty liver disease, and gastro-esophageal reflux. Wand and Dietz (2002) reviewed a sample of hospital discharge records from 1979-1999, specifically to identify changes in the number of obesity associated diseases and in children aged 6-17 and the economic impact. Over 42,500 hospital discharges were noted between 1979 and 1981 in children with a diagnosis of diabetes, obesity, sleep apnea, and/or gall bladder disease. The number of hospital discharges from 1997-1999 with the same diagnoses were over 40,600. In allowing a five percent inflation rate, Wang and Dietz (2002) estimated that hospital costs of treating children for obesity-associated conditions rose from $35 million to $127 million from 1979–81 to 1997–99. Type 2 diabetes alone often has resulted in a myriad of health issues such as blindness, renal failure, neuropathy, and cardiovascular disease. Overweight children have a higher incidence of newly diagnosed asthma. In addition, sleep apnea has been found to be a result of obesity (The Center for Health and Health Care in Schools, 2007). Obstructive sleep apnea consequences have included failure to thrive, bedwetting, attention-deficit disorder, behavior problems, poor academic performance, and cardiopulmonary disease (The Center for Health and Health Care in Schools, 2007).

Obese children are prone to become obese adults, thus increasing the likelihood of health conditions due to obesity continuing into adulthood. The Center for Health and Health Care in Schools (2005) noted that the older the obese child is, the greater the likelihood of the child becoming an obese adult. In a New England Journal of Medicine piece Olshansky et al. (2005) reported that obesity has lessened the life expectancy in the United States and the rates of death due to obesity should rise. “These trends suggest that

the relative influence of obesity on the life expectancy of future generations could be markedly worse than it is for current generations" (Olshansky et al., 2005, p. 1141).

Psychosocial consequences.

The psychosocial consequences of obesity have proven numerous. The importance of physical appearance has been ingrained at a young age. According to Jonides, Buschbacher, and Barlow (2002) youth who perceived themselves as different from peers reported feeling dissatisfied with themselves, often as a result of excess weight. In addition Jonides and colleagues (2002) cited a common reason for youth feeling different was due to having excess weight. Janicke and colleagues (2007) noted that "overweight children reported lower quality of life than their non-overweight peers" (p. 1799). Overweight adolescents were more socially isolated, experienced more episodes of peer victimization, and had more reports of being dissatisfied with their body than non-overweight adolescents (Janicke et al., 2007, p.1799). Madowitz, Knatz, Maginet, Crow, & Boutelle (2012) determined that weight related teasing was associated with depression in children. The Center for Health and Health Care in Schools (2005) further noted that overweight children also reported feeling lonely, sad, and nervous p. 2). These emotional difficulties coincided with an increase in alcohol consumption (The Center for Health and Health Care in Schools, 2005).

Background and Significance

In order to effectively halt the rise in obesity and eliminate the health issues associated with obesity, the underlying causes must be addressed. Genetic, biological, psychological, sociocultural, and environmental factors have roles in the obesity

epidemic. Pediatric obesity is an active and ever changing process where the underlying causes interact with each other (Committee on Nutrition, 2003).

Contributing Factors of Obesity

Multiple factors contribute to the development of obesity. The following section details the genetic, biological, psychological, and environmental contributors of obesity.

Genetics. Several genetic conditions have been associated with obesity such as Prader-Willi syndrome, Bardet-Biedl syndrome, and Cohen syndrome (Committee on Nutrition, 2003). However, it is uncommon for a single gene disorder to result in childhood obesity (Council on Sports Medicine and Fitness and Council on School Health, 2006). Twins raised apart have been found to have closely correlated BMIs (Anderson & Butcher, 2006). One theory about how genes are associated with obesity is the thrifty gene hypothesis. Genes that multiplied under different environmental conditions when food was scarce are being challenged in times when food is plentiful (Caprio et al., 2008). Genes may also influence the drive to overeat, the tendency to be physically inactive, a diminished ability to use dietary fats as fuel, and the capacity to store fat (Centers for Disease Control, 2011a). However, recent increases in the American population's weight cannot be solely explained by genetics. Genetic composition does not change rapidly, and the characteristics of the average American have not changed drastically, while obesity has dramatically increased (Centers for Disease Control, 2011a).

Obese parents have obese children, perhaps due to the child's modeling parental behavior. Parental obesity has been a stronger predictor of obesity in adulthood than the child's weight (Committee on Nutrition, 2003). Research indicated that there is a 75%

chance that a child will be overweight if both parents are obese. The chance decreases to 25-50% if only one parent is obese (Bishop, Middendorf, Babin, & Tilson, 2005).

Biological. Weight gain has often been associated with various periods of human development. Children who are breastfed have a reduced rate of obesity in later childhood. Anderson and Butcher (2006) noted that the mechanism by which breast feeding affects weight in childhood is not clear. Possible rationales were an endocrine response to breast milk, or that breast feeding may affect future food preferences. Mothers that breast feed may have different nutritional and activity standards for their children (Anderson & Butcher, 2006). Adolescence is another critical period for the development of obesity. Insulin resistance is a normal phenomenon in adolescence and is thought to be a contributing factor in weight gain.

Psychological. Emotional factors have also played a role in childhood obesity. The Committee on Nutrition (2003) noted the detrimental effects of over controlling parental behavior. Examples include: child-feeding practices, verbal prompting to eat, and attentiveness to eating behavior. Maternal perception of daughter's risk of overweight may also influence the child's eating habits. Puder and Munsch (2010) cited familial stressors such as financial hardship of the family and mental illness or physical illness of the parent as important factors in pediatric obesity. Most frequent psychosocial problems implicated in pediatric obesity were impulse control, attention-deficit hyperactivity disorder, depression, anxiety, and uncontrolled eating behavior (Puder & Munsch, 2010). Although children with attention-deficit hyperactivity disorder are known for their increased activity level, obesity has been linked to loss of impulse control and need for gratification in this population(Puder & Munsch, 2010).

Environmental. Societal changes have influenced child rearing practices and thus childhood obesity. Baker, Little, and Brownell (2003) concluded social norms influence adolescent attitude with respect to healthy eating and activity behaviors. Anderson and Butcher (2006) noted that an increase in the hours worked each week by the child's caregiver increased the probability that the child was obese. Having both parents in the labor force may both increase consumption of food eaten away from home and use of pre-prepared foods at home. Instead of family meals, the members may not be eating together and often choose quickly prepared high caloric meals, frequently eaten in front of the television. Additional obstacles to the family meal included parental work schedules, poor meal planning, and children that may be finicky eaters (Hammons & Fiese, 2011, p. e1572).

Leisure time is increasingly spent being sedentary instead of active. Changes in schools' curriculum have impacted the requirements of physical education programs to allow for more academics (Anderson & Butcher, 2006). The percentage of United States students that participated in physical education classes decreased during the 1990s, dropping to under 30% for students in grades 7 through 12 by the year 2000 (Budd & Volpe, 2006). The National Association of Sport and Physical Education set guidelines for the amount of school-based physical education instructional time including 150 minutes weekly for elementary students and 225 minutes weekly for middle and high school students. McCullick (2012) concluded that only six states mandate the appropriate amount of physical education for elementary students, two states for middle school, and none for high school.

Media outlets have played a role in childhood obesity through various mechanisms. Television watching has increased sedentary time. Television advertisement of low nutrient foods may encourage unhealthy eating habits and increased snacking. Screen time also may result in decreased sleep time due to late night television watching time, playing video games or texting friends. Numerous studies have added evidence to the correlation between television viewing and increased BMI. A study of Scottish children indicated an increased risk of obesity at age seven if more than eight hours of television viewing occurred per week at age three (Reilly et al., 2005). A similar study among Japanese children noted an increased risk of obesity by age six (Sugimori et al., 2004). Proctor and team (2003), in a longitudinal study of 106 children, concluded that children who watched the most television during childhood had the greatest increase in body fat over time. A larger longitudinal study with over 7,000 children noted that number of television viewing hours a day were significantly associated with an increased rate of BMI (Danner, 2008). Evidence also indicated that sleep loss was associated with a greater risk of obesity, yet causality has not been established (Cappuccio et al., 2008). The Council on Communications and Media (2011) noted the following mechanisms have been hypothesized: lack of sleep results in more fatigue and, therefore, the child is less physically active; child snacks more in order to maintain energy due to lack of sleep; and sleep loss results in metabolic changes for the child (p. 203). Cappuccio and colleagues (2008) further added that a reduction in sleep is associated with a reduction in leptin and an increase in ghrelin which leads to increase in appetite and caloric intake.

While the above factors may contribute to obesity, the simplest explanation of childhood obesity is that children are consuming more calories and exercising less. If more calories are taken in than the body is using then the body will store the extra calories as fat. Levy, Friend, and Wang (2011) reported that sugar sweetened beverage (SSB) consumption affected total energy intake and BMI. The consumption of these beverages doubled in the United States between 1977 and 2002. Levy and team (2011) reported that children and adolescents obtained 10-15% of their total energy from SSB. According to data from NHANES, children age 6-11 consumed 184 kcal of sugar sweetened beverage daily. Replacement of SSB with water was associated with an average reduction of 183 kcal for ages 6-11 (Levy et al., 2011). An increase of 50 kcal/day leads to a weight gain of 5 pounds per year. A soda a day when added to the child's normal intake produces a weight gain of 15 pounds per year (Council on Communications and Media, 2011).

Marketing of fast food and snacks has aided the rise of childhood obesity. The Institute of Medicine in a 2006 review concluded that exposure to television contributed to an increase in body fat in children aged 2-11. Chandon and Wansink (2012) concluded that children were exposed to more than 40,000 food advertisements a year with a majority of the advertising for foods high in fat, sodium, and added sugar. According to the Council on Communications and Media (2011), more than 80% of all advertisements in children's programming have been for fast foods or snacks. In addition, for every hour children watch television they see approximately 11 food advertisements. Advertising is an effective marketing tool for children as advertising influences children's choices and future food requests (Chamberlain, Wang, & Robinson, 2006).

Fast food has become an integral part of American life. Americans spend more than $110 billion a year eating at fast food places—more than has beenspent on education, food, or cars (Council on Communications and Media, 2011). According to Bowman, Gortmaker, Ebbeling, Pereira, and Ludwig (2004), 30% of American youth eat fast food on a daily basis, contributing to an additional 187 kcal. In a year the calories could equate to an additional 6 pounds of weight gained per child (Bowman et al., 2004).

Children are more sedentary than in previous generations. In a longitudinal study, Basterfield and colleagues (2011) documented a decrease in physical activity and an increase in sedentary behavior before adolescence. Research by Sallis and Glanz (2006) indicated that with improved access to facilities such as playgrounds and gymnasiums, children are more active. Certain factors inhibit outdoor play and conversely lead to a more sedentary lifestyle, among these were the lack of safe areas to play, the lack of sidewalks, and an increase in automobile traffic.

Health Promotion Efforts

Healthy People 2020 (U. S. Department of Health and Human Services, n.d.) identified twenty-two nutrition and weight status objectives with a common goal to "promote health and reduce chronic disease risk through the consumption of healthful diets and achievement and maintenance of healthy body weights" (Goal section, para. 1). Two objectives, in particular, addressed the needs of the child: nutrition and weight status objectives 6.3 and 10. The goal of these objectives was to increase the proportion of patient visits to physician that included counseling about nutrition or diet and to reduce the proportion of children and adolescents who were considered obese. According to Healthy People 2020 (n.d.), just over 12% of child and adult physician office visits

included nutritional or dietary counseling. In order to achieve these goals, health care providers have needed practice guidelines for the most appropriate methods of treating the obese child. The implementation of evidence-based recommendations is vital to reverse the current obesity trend. The Expert Committee on the Assessment, Prevention and Treatment of Child and Adolescent Overweight and Obesity released recommendations for the management of overweight and obese children (Barlow, 2007). The recommendations include behavior modifications, lifestyle changes, medications, and possibly surgery for the severely obese child.

Efforts to promote an increase in healthy behaviors such as physical activity and healthy diet are vital to combat the obesity trend. With the growing rise in childhood obesity, it has been apparent that the efforts were failing. Lifestyle modification programs have been instituted in schools across the country. The Institute for Alternative Futures DRA Project (2008) identified 45 school based wellness programs such as the 5-a Day Power Plus, bSAFE-bFIT, and Eat Well and Keep Moving. Another important step to promote healthy behaviors is to address home environment issues. It is estimated that children spend four hours a day watching television (Zenzen & Kridli, 2009). Low nutrient, high caloric food and drink are widely available to children in the form of fast food and soft drinks (Bobo, Shantz, Kaufman, & Kollipara, 2009). Lifestyle modification programs can call for parental involvement. According to Howard (2007), parents of overweight children may be unaware and/or unconcerned that the child is overweight, not realizing the threat to the child's health. Murtagh and Ludwig (2011) suggested that pediatric obesity should be considered as a sign of neglect, with removal

of the children from the home and into foster care as a possible solution. This radical approach underscores the severity of the childhood obesity problem is.

Obesity treatment in primary care. Primary providers may feel they lack the time and resources to properly treat the obese child. Spear and colleagues (2007) cited a survey of pediatric care providers including physicians, nurse practitioners, and dietitians that identified the three treatment areas in which they felt least competent: "behavioral modification strategies, guidance in parenting techniques, and addressing of family conflicts" (p. S280). However, behavior modification such as increased physical activity and developing healthier nutritional habits has been the most successful approach in improving health status and maintaining weight loss (Spear et al., 2007). According to Spear and team (2007) dietitians felt confident in their capability to modify dietary and physical activity needs based on patient assessment. Specialized primary provider training in obesity treatment has been lacking. In 2012 The Obesity Society, in conjunction with 13 professional organizations, offered the Certification Examination for Obesity Medicine Physicians (American Society for Metabolic and Bariatric Surgery, 2012). The American Dietetic Association has offered postgraduate certification available only to dietitians in adult and childhood obesity management (American Society for Metabolic and Bariatric Surgery, 2012). The American Dietetic Association has sponsored a pediatric weight management continuing education program that is only available to dietitians (Spear et al., 2007). Trowbridge, Sofka, Holt, and Barlow (2002) suggested that provider characteristics may influence attitudes and practices in the management of pediatric obesity. According to a survey by Trowbridge and colleagues (2002), 25% to 28% of PNPs and pediatricians consumed less than the recommended five

or more servings of fruits and vegetables per day and only approximately 20% of the providers exercised 30 minutes or more five or more days a week. Thus, providers may not serve as the ideal role models for maintaining healthy habits.&&&&&

Expert committee recommendations. In 2007, an Expert Committee recommended four stages of interventions in pediatric obesity: prevention plus, structured weight management, comprehensive multidisciplinary interventions, and tertiary care intervention (Spear et al., 2007). Prevention plus strategies included educating patients and families about lifestyle changes such as daily intake of at least five servings of fruits and vegetables a day, elimination of sugar-sweetened beverages, and at least one hour of physical activity per day. In addition, screen time should be limited to two hours or less a day with no television viewing for a child under the age of two and no television in the child's bedroom (Spear et al., 2007). The goal of prevention plus would be weight maintenance and decreasing BMI as the child ages. With additional training pediatric weight management prevention plus strategies can be executed by health professionals such as primary health care providers, registered nurses, and registered dietitians (Spear et al., 2007).

Structured weight management included more supportive measures to assist the child in changing behaviors. The same behaviors, food consumption, activity, and screen time, were targeted as in Prevention Plus. However, stage 2 involved additional training in behavioral counseling for the providers. The goal of this program was weight maintenance as age and height increase, resulting in a decreasing BMI (Spear et al., 2007). Parental involvement is necessary in behavior modification for children under 12 years of age. Monthly follow-up was recommended with referral to stage 3

comprehensive multidisciplinary intervention if no improvement in the BMI/weight status after three to six months (Spear et al., 2007).

A comprehensive multidisciplinary approach involved specialists to maximize support for behavior change (Spear et al., 2007). The goals of treatment are the same as those of structured weight management stage. Distinctive characteristics of this stage are "increased intensity of behavioral change strategies, greater frequency of patient-provider contact, and the specialists involved" (Spear et al., 2007, p. S276). Multidisciplinary programs that include behavioral counseling, promotion of physical activity, dietary counseling, and parental education are vital in combating pediatric obesity. Team members include a behavioral counselor, registered dietitian, and exercise specialist (Spear et al., 2007). Some options for behavioral counseling as suggested by Spear and colleagues (2007) included social worker, psychologist, or trained nurse practitioner. The team would not take the place of the primary care provider who would continue to monitor the health care needs of the child and continue to be a source of support for the family. Spear and colleagues recommended weekly visits for eight to twelve weeks and then monthly visits to help maintain new behaviors.

Tertiary care interventions encompassed medication and possibly surgery (Barlow, 2007). These intensive interventions have been utilized in limited numbers in the pediatric population (Spear et al., 2007). Patient selection criteria included the child's age, support system, readiness for change, and degree of obesity (Spear et al., 2007).

Financial restraints. Health care is an industry, and unfortunately the cost associated with the holistic treatment of pediatric obesity is financially draining to a provider. Utilizing behavioral techniques often lengthens the encounter. "Generally,

third-party payers do not reimburse physicians who provide such services themselves or who employ multidisciplinary teams within their practices to provide the services" (Spear et. al, 2007, p. S280). Given the increase in the incidence and prevalence of pediatric obesity, the specialized multidisciplinary obesity clinics cannot meet the needs of this population. It is up to the primary care providers to affect change in the obese pediatric patient.

Although multidisciplinary programs are recommended by the American Academy of Pediatrics, the costs associated with the program are often not covered by insurance and the programs are scarce, leaving the service inaccessible to many potential clients. Slusser and team (2011) noted the average cost to participate in a moderately intense multidisciplinary program was approximately $3000. This includes 50.5 hours of intervention with a physician, dietitian, physical therapist, and psychologist (Slusser et al., 2011). Even though the success rate of such a program is estimated at 41% no statewide or national payment packages exists (Slusser et al., 2011). Slusser and team (2011) examined the funding for 15 multidisciplinary obesity clinics. Reimbursement for registered dietitian and behavioral intervention services were inconsistent. Clinics have to seek out additional funding sources such as institutional support, grant support, foundation support, and endowments (Slusser et al., 2011). Additionally, there are too few pediatric obesity programs to meet the need of the rising numbers of obese children. Eisenmann (2011) identified nine stage 1 programs, 13 stage 2 programs, 16 stage 3 multidisciplinary programs and six stage 4 programs that operated from November 2008 through April 2009 in the United States. Currently there is no national registry of pediatric obesity programs.

Childhood obesity is a serious public health concern with both short term and long term consequences for the individual and society as a whole. The American Academy of Pediatrics has recommended a staged approach to managing the obese child. Even though multidisciplinary obesity clinics have had successful outcomes, these programs are not readily available due to the cost of treatment and the scarcity of the programs. The majority of obese children and adolescents will be cared for by primary care providers. Primary care providers face the challenge of dealing with poor reimbursement and a lack of specialized training in managing the obese child.

Purpose

While research findings indicated that specialized multidisciplinary clinics are the most successful in treating child and adolescent obesity, the vast majority of obese pediatric patients will be managed by primary care providers. It is essential that these healthcare professionals have guidelines or recommendations that give direction for care. The purpose of this project was to analyze the literature to identify evidence-based approaches in for management and treatment of pediatric obesity in primary care, addressing the question "What are the best practices for the treatment of overweight and obese children to achieve a decrease in BMI in pediatric primary care?". This project was focused on overweight or obese school age children and adolescents ranging in age from 6 years to 18 years old. The children have a BMI above the 85th percentile for children of the same age and sex. The result of this project have provided insights into best practice guidelines for health promotion and obesity prevention programs addressing lifestyle interventions in the primary care setting for the pediatric population.

PICO Definitions and Descriptions

The PICO format was used to develop questions that assisted in the search process to find evidence. The components of a PICO question include the "population of interest, the intervention of interest, comparison of interest, and outcome on interest" (Melnyk & Fineout-Overholt, 2005, p. 8). The population of interest for this project was the obese or overweight child or adolescent who attended a primary care pediatric setting. The intervention of interest was the implementation of a multidisciplinary pediatric obesity program. The comparison was care provided solely by the primary provider. The outcome of interest was decrease in Body Mass Index (BMI).

Definitions

- **BMI.** A tool to assess body fat based on height and weight (Barlow, 2007). BMI correlates with body fat percentage (Krebs, et al. 2007).
- **Childhood obesity.** Barlow (2007) defines childhood obesity as a BMI at or above the 95th percentile for children of the same age and sex.

  Childhood overweight. A BMI between the 85^{th} and 94^{th} percentiles for children of the same age and sex (Barlow, 2007).
- **Primary care provider.** Primary care providers include physicians, nurse practitioners, and physician assistants that diagnose and treat acute and chronic illnesses. According to The American Academy of Family Physicians (2012), primary care also involves health promotion, health maintenance, disease prevention, counseling, and patient education.
- **Child and adolescent.** For the purpose of this paper, child and adolescent included the population aged 6-18 years of age.

Search Process

A comprehensive search of the literature was conducted to obtain evidence on the topic of outpatient pediatric weight loss approaches and the impact on long term weight loss. The discussion of the comprehensive search also includes a summary of the findings and criteria for the selection and rejection of literature.

Inclusion and exclusion criteria. Inclusion criteria were established to determine which evidence would be examined further. Evidence reviewed addressed the target population and included treatment options for overweight and obesity. Treatment options that involved behavioral interventions were included. Target audience for treatment included the overweight or obese child. Interventions that incorporated the family were also included. Since the target population was children and adolescents, evidence related to adults was excluded. Exclusions included articles that discussed mental and developmental issues in an effort to solely manage the obesity issue. Evidence targeting adult and geriatric population was excluded. Due to the focus of intervention on behavioral/lifestyle issues, evidence limited to pharmaceutical treatments and bariatric surgery were also excluded. Citations related to inpatient obesity treatment were also excluded. Only citations related to outpatient treatment were included. In an effort to gather the most current data, the search was limited to articles written in English after 2002. Research from other countries was included in an effort to expand the knowledge base. Studies selected for review included RCTs, systematic reviews, evidence-based guidelines, and research studies. Additional opinions by experts in the field were included to add support.

A thorough search of the literature to uncover evidence on the topic of pediatric obesity was conducted. The initial databases included the Cumulative Index to Nursing and Allied Health Literature (CINAHL) Plus, PubMed, National Guidelines Clearinghouse, Psych Info, Medline, and Cochrane Library. An additional search was conducted in the *Journal of the American Academy of Pediatrics*. Search terms included "child," "adolescent," "obesity," "treatment," "multidisciplinary," and "primary care." The CINAHL search using "child obesity treatment" limited to 2002-2012 resulted in 583 hits. When "primary care" was added to the search, 39 articles were found. Adding the term "multidisciplinary" resulted in 29 hits. "Adolescent obesity treatment multidisciplinary" resulted in 14 articles. When the "primary care" was added, 10 articles were identified.

A search within the National Guideline Clearinghouse using the terms "child obesity treatment" yielded 89 articles. Further narrowing by including "primary care" yielded 82 results and with "multidisciplinary" limited the results to 28. "Adolescent obesity treatment" generated 173 articles that were further narrowed with the inclusion of "primary care" to 157 and "multidisciplinary" to 55. The National Guideline Clearinghouse did provide a guideline synthesis of pediatric obesity treatment.

The Cochrane Library search of "child obesity treatment" yielded six reviews and "adolescent obesity treatment" yielded 5 reviews. When primary care was added, 1 review was identified, with multidisciplinary 10 reviews.

Pub Med offered the most data. A search of "child," "obesity," and "treatment," resulted in over 1,570 hits. The field was further limited to "primary care" yielding 113 results, and also limited to "multidisciplinary" which yielded 45 results. A search of

"adolescent," "obesity," and "treatment" resulted in over 1,530 hits. When "primary care" was added, the field was reduced to 101. "Multidisciplinary" further reduced the field to 44.

Additional searches included Medline and Psych Info. Medline search resulted in over 1200 articles related to child obesity treatment. The field was narrowed to "primary care" resulting in 65 hits and "multidisciplinary" resulting in 56 hits. "Adolescent obesity treatment" resulted in over 1000 articles. The field was limited to 66 with "primary care" added and to 75 when "multidisciplinary" was added. An initial search in Psych Info for "child obesity treatment" resulted in 553 articles, but after limiting to primary care and multidisciplinary search resulted in 28 and 26 articles for further review respectively. A Psych Info for "adolescent obesity treatment" resulted in 320 articles and was limited to 12 with the additional terms "primary care" and 19 with "multidisciplinary."

A review of *Pediatrics* resulted in 864 hits. When the quick links was utilized with obesity as the topic, the results were limited to guidelines on prevention and treatment of childhood overweight and obesity. The link led to the discovery of the "Planning, Building, and Sustaining a Pediatric Obesity Program: A Survival Guide" by the National Association of Children's Hospitals and Related Institutions (2011).

Summary

Obesity prevalence among children and adolescents has nearly tripled since 1980. Children and adolescents with obesity have been at risk for developing the comorbidities seen in obese and overweight adults. The challenge for healthcare providers has been to provide effective management and treatment opportunities for the pediatric population.

A review of literature was done to find evidence- based approaches effective in the management and treatment of pediatric obesity in primary care. The terms “child,” “adolescent,” “obesity,” “treatment,” “primary care,” and “multidisciplinary” were used to find evidence. The search products offered a foundation in addressing the treatment of the overweight and obese child in the outpatient setting. After a comprehensive literature search, 75 articles of evidence met the criteria for analysis.

CHAPTER 2

LITERATURE ANALYSIS

Introduction

A variety of types and quality of evidence were evaluated to determine evidenced based approaches in the management and treatment of pediatric obesity in primary care. Evidence tables (see Appendix A) were useful in organizing important features of the studies, including the authors, sources, research design, purpose of review, main results, and recommendations. Next, the Scottish Intercollegiate Guidelines Network (2008[SIGN]) rating system for the hierarchy of evidence was used to classify the various sources of evidence into levels (see Appendix B). Each study was evaluated utilizing the SIGN (2008) methodology checklist as a guide (see Appendix C). Recommendations developed from the evidence was graded using the ABCD method (see Appendix D). The method of literature analysis and the outcome of the types and strength of evidence are explained below.

Method of Literature Analysis

Once appropriate resources were identified, an evidence table was utilized to organize and classify the articles. The SIGN (2008) classification was used to rate the evidence from Level 1++ to Level 4. The SIGN (2008) methodology checklist was also used to appraise each work. The analysis of the literature was completed by establishing the studies that would be included and the ability of the study to address approaches in the management and treatment of pediatric obesity in primary

care. Each study was then evaluated based on the appropriateness, methodology, rigor, quality, and suitability to provide insight into treatment approaches in the obese child (SIGN, 2008).

Analysis

The systematic reviews were divided into categories ranging from 1++ to 2++ with 1++ indicating the highest quality research. The systematic reviews (Grimes-Robison & Evans, 2008; Luttikhuis et al., 2008; and Waters et al. 2011) were rated a level 1++ due to the components that made them high level evidence. Each review had a clear study focus, detailed description of the methodology, and a rigorous literature review. Well-conducted meta-analyses, systematic reviews and RCTs with a low risk of bias (For example, August et al., 2008; Barlow, 2007; Delgado-Noguera, Tort, Bonfill, Gich, & Alonso-Coello, 2009; and Hughes & Reilly, 2008) were rated 1+. Meta-analyses, systematic reviews, or RCTs with a high risk of bias (Diaz, Esparza-Romero, Moya-Camarena, Robles-Sardin, & Valencia, 2010; Fowler-Brown & Kahwati, 2004; Reinehr et al., 2010; and Vanhelst et al., 2011) were classified as 1-. Bias was noted in the evidence due to the low participation rate which caused difficulty in rating the quality of the data. High quality cohort studies with a very low risk of confounding bias and a high probability that the relationship is causal (Tan-Ting & Llido, 2011) were categorized as a 2++.

The literature search yielded additional articles that according to the SIGN (2008) levels of evidence ranged from a 2+, well conducted case control or cohort study, to a 4, expert opinion. The articles that fall into this category add insight and support the above mentioned meta-analysis and systematic reviews. Well-conducted case control or cohort

studies with a low risk of confounding or bias and a moderate probability that the relationship is causal (For example, Bean, Mazzeo, Stern, Evans et al., 2011; Cretikos, Valenti, Britt, & Bauer, 2008; DeNiet et al., 2011; Eliakim, Friedland, Kowen, Wolach, & Nemet, 2004; and Woolford, Sallinen, Clark, & Freed, 2011) were ranked a level 2+. The evidence supported a causal relationship and showed consistency in the results. Case control or cohort studies with a high risk of confounding or bias and a significant risk that the relationship is not causal (Allen, Touger-Decker, O'Sullivan-Maillet, & Holland, 2003; Henes, Collier, Morrissey, Cummings, & Kolasa, 2010; Klein et al., 2010; and Madsen et al., 2009) were categorized as 2-. The evidence demonstrated selection bias.

Additional evidence found included non-analytic studies, such as case reports and case series (For example, Banks, Shield, & Sharp, 2011; Goldman, Modan-Moses, Bujanover, Glasser, & Meyerovitch, 2004; Holt et al., 2010; and Woolford, Clark, Gebremariam, Davis, & Freed, 2010) were classified as a level 3. Several expert opinion articles (Baker, Farpour-Lambert, Nowicka, Pietrobelli, & Weiss, 2010; Bennett & Sothern, 2008; Nichols, Livingston, & Schumann, 2002; Nowicka, 2005; and Viner & Nicholls, 2005) provided additional support for lifestyle intervention methods.

Provider Attitudes/Perceptions

The literature identified pediatric obesity management and prevention as a significant issue in medical practices. According to Holt and colleagues (2010) physicians acknowledged that pediatric obesity and overweight are important issues, however, physicians often play a limited role in the treatment and management. Jelalian and team (2003) noted that providers reported a lack of competence or not being comfortable with addressing pediatric obesity. Rausch and associates (2011) found that

providers reported their counseling was not effective. Another barrier identified by King and team (2007) was the parents' sensitivity of the topic of pediatric obesity and overweight as perceived by providers. Additional research needs to be completed to validate the evidence. Current research limitations included small sample size and potential for selection bias. Self-reported data was only available. Relationship between provider attitude and practices and patient response was not addressed.

Current Treatment Practices

The literature reported that health care providers were not adhering to the current recommendations for treatment and prevention of pediatric obesity. Systematic reviews by Barlow (2007) and Spear and colleagues (2007) provided the strongest evidence. O'Brien and team (2004) with a retrospective chart review supported the evidence. Surveys by Siversten and associates (2008), and Taveras and associates (2007) also supported the knowledge base. Several examples of BMI not being calculated were found in the literature. According to Huang and team (2011) "less than 50% of primary providers assessed BMI percentiles regularly in children" (p. 24). Klein and team. (2010) reported similar findings and added that "most pediatricians do not have time to counsel on overweight and obesity" (p. 265). Rausch and colleagues (2011) also reported that less than half of the sample group of providers adhered to the AMA criteria for identifying overweight and obese children. Guideline adherence is an issue worldwide. In an Australian study, Siversten and team. (2008) found that 28% of providers followed the National Health and Medical Research Council's guidelines. Seventy-eight Israeli providers were not familiar with pediatric obesity guidelines (Goldman et al, 2004). O'Brien and team (2004) found that providers were not consistently taking a diet history,

physical activity history, or addressing screen time during office visits. In a survey by Taveras and associates (2007), less than 50% of the sample reported discussing screen time or sugar-sweetened beverage consumption with their providers.

Effective strategies for treating the obese and overweight child were not well defined in the literature. No individual treatment approach was found to be superior and no standardized approach was available. Current recommendations involve increased identification of obesity, patient centered counseling and a comprehensive approach to treatment. The evidence yielded several limitations. Small sample size and selection bias may account for the data. In addition, provider documentation may not have accurately reflected the office visit.

Multidisciplinary Pediatric Clinics

In systematic reviews, Spear and colleagues (2007) and Barlow (2007) identified multidisciplinary clinics as the recommended course of treatment for management of the obese and overweight child. Additional support came in the form of a case study, (Nowicka et al., 2007), a controlled trial (Nowicka et al., 2008), an observational study (Vignolo et al., 2008), and a cross-sectional survey (Woolford et al.,2010) . Nowicka and associates (2008) noted that the success of the treatment approach may be due in part to the high motivation of the children. In a five year observational study, Vignolo and team. (2008) found that children that participated in a multidisciplinary program continued to maintain a decrease in BMI. However, Woolford and colleagues (2010) found that referrals to multidisciplinary programs were limited due to the availability of the programs. Family therapy offers additional support for the child. Nowicka and associates (2007) noted a decrease in child BMI after participation in a family therapy

multidisciplinary clinic. Ranstrom (2009) demonstrated health improvements after participation in a family centered program.

Numerous limitations were found in the literature. Nowicka and colleagues (2008) presented a non-blinded study. Participants were motivated to experience weight loss. Lack of a randomized control and small sample size examined also weakened the evidence. Further research is warranted to verify the recommendations from the evidence.

Motivational Interviewing

Motivation Interviewing was identified in the literature as having potential benefits in the treatment and prevention of pediatric obesity. The strongest evidence was provided by systematic reviews (Hughes & Reilly, 2008; Luttikhus, et al., 2008; and Sargent et al., 2011), and a randomized control trial (Moodie et al., 2008). Irby and team (2010) described a situation in which an obese child had a decrease in BMI after participating in a four month multidisciplinary program that utilized motivational interviewing. Pollack and colleagues (2009) also found that when motivational interviewing was adhered to children lost weight and showed an increase in physical activity and a decrease in screen time. In addition, Pollack and colleagues (2009) identified older female providers as utilizing motivational interviewing more often. The search for evidence found high quality evidence regarding motivational interviewing to be limited.

Conclusion

The evidence for the effective management and treatment of pediatric overweight and obesity in the primary care setting was found in the literature (August et al.., 2008;

Barlow, 2007; Luttikhuis et al., 2008; Nichols et al., 2002; Sargent et al. 2011; and Whitlock et al., 2010). However, the literature also revealed opportunities for improvement in the primary care setting (Cretikos et al., 2008). Cretikos and team (2008) found that Australian general practitioners do not use available opportunities to manage the overweight and obese child. Ewing and colleagues (2009) and Holt and colleagues (2011) acknowledged that primary providers would benefit from additional training not only to improve their skills in obesity management but to also acquire skills in motivational counseling techniques.

Multidisciplinary intervention studies (Grimes-Robison & Evans, 2008) received the highest ranking according to SIGN. Eliakim and associates (2002) recommended a combined structured multidisciplinary intervention noting a decrease in body weight, decrease in body mass index, and overall improved fitness. Grimes-Robison and Evans (2008) noted the most successful obesity programs utilize additional disciplines. Common themes were found in the literature review describing the characteristics of successful weight management programs as described by the literature (see Table 2.1). Table 2.2 denotes characteristics of unsuccessful weight management programs.

Table 2.1 Characteristics of Successful Weight Management Programs.

Category	Criteria
Key Components	Physical activity, dietary modification, and decreased sedentary behavior. Program included education and skill-building on diet, exercise and decision-making.
Weight loss/BMI	Patient met weight loss goal or no additional weight gain. Decrease in BMI or stabilized BMI.
Motivation	Parents and children have desire to make lifestyle changes.
Positive home environment	Daily diaries provided to monitor changes made at home.
Parental involvement	Required family involvement throughout program including diet and physical activity.

Category	Criteria
	Sessions with and without child present.
Comprehensive assessment	Assessment included weight history, current diet and physical activity records, readiness to change.
Group and individual behavior therapy throughout program	Tailored to meet child's needs. Scheduled structured exercise sessions at least once a week in addition to scheduled counseling sessions.
Interdisciplinary approach	Health care team includes registered dietician, mental health professional, healthcare provider, exercise specialist.
Continuous assessment	Evaluate body measurements, dietary intake and physical activity throughout program.

Prevailing themes were evident in the literature. Whatever the method of delivery, primary care or a multidisciplinary clinic setting, the treatment method of choice involved an increase in physical activity, dietary modification, a reduction in sedentary behaviors, parental involvement, and the utilization of behavior modification techniques (Hughes & Reilly 2008, and Luttikhuis et al., 2008). Another common theme in the literature is low patient retention and follow-up (Ewing et al. 2009; Reinehr et al., 2010; Tan-Ting, & Llido, 2011; Madsen et al., 2009) and low provider participation (McFarlane et al, 2009; and Sivertsen, 2008). A variety of issues impact the delivery of obesity treatment. Issues such as clinic location, insurance coverage, and length of visits may prevent families from participating.

Table 2.2 Characteristics of Unsuccessful Weight Management Programs.

Category	Criteria
Program inflexibility	Scheduling issues, program location. Behavior modification lengthens visits.
Motivation	Children and parents not highly motivated.
Insurance/ability to pay for service	Program not covered by insurance.
Location	Not enough centers to meet current and projected needs.
Length of program	Drop-out rates increased as length of program increased.
Transportation	Children/parents unable to attend sessions due

Category	Criteria
	to lack of transportation.
Failure to meet expectations	Participants need realistic goals.
Lack of provider training	Providers not comfortable in the role of obesity counseling.

Summary

The evidence presented provides a foundation to determine evidenced based approaches in the management and treatment of pediatric obesity in primary care. As Whitlock and team (2008) noted "there are significant gaps in our understanding of obesity treatment in children and adolescents" (p. v). Further research is warranted to improve the treatment of the overweight and obese child and adolescent, leading to policy development for obesity prevention. Recommendations from the sources in this project served to guide the development of protocols for evidence-based practice. Appendix B provides the rating description as defined by SIGN (2008).

CHAPTER 3

GUIDELINES FOR THE OUTPATIENT MANAGEMENT OF PEDIATRIC OVERWEIGHT AND OBESITY

Recommendations

The primary recommendation of this evidence-based practice project is that parental involvement is imperative for weight loss in the overweight and obese child. In addition, emphasis is placed on lifestyle modification as a treatment. Other recommendations focus on the components of a multidisciplinary obesity clinic. Additional recommendations discuss the primary providers, their role in obesity management and opportunities for improvement in obesity management. The recommendations were graded using the SIGN (2008) guidelines for grading (see Appendix D). The grading is based on the strength of evidence that supports the recommendation (see Appendix B). The strongest evidence rating is denoted with each author's name

Guideline

Recommendation I: Health care providers must involve the family in the interventions to treat and manage the overweight or obese child. (Strength of recommendation=A)

Involving parents in the treatment is critical for the success of the intervention (Grimes-Robinson & Evans, 2008, 1+++; Hopkins, 2008; Hughes & Reilly, 2008, 1+;

Luttikhuis et al., 2009; McCallum et al., 2005, 1++, Nemet, 2008, 1-; and Spear, 2007 1+). "Parents serve as role models and exert a powerful influence on the children's exposure to food, food selection, and other health promoting behaviors (Grimes-Robison & Evans, 2008, p. 333). Spear and colleagues (2007) noted that including the parent as an agent of change is important in reinforcing behavior up to age 16. "The evidence suggest that targeting parents to lose weight improves their child's outcomes, particularly for children < 12 years of age" (Spear et al., 2007, p. S267).

Recommendation II: Pediatric health care providers should follow recommended guidelines in identifying overweight and obese children and adolescents.

(Strength of evidence= B)

Early identification of the obese child is crucial in the management and treatment of the child (McCallum et al., 2005, 1+; Nichols, et al., 2002, 1-; O'Brien, et al., 2004, 2++; and U.S. Preventive Task Force, 2010, 1+). McClintok and Hedge (2009) suggested an increase in the application of tools to assess childhood obesity. According to a Rausch and associates (2011) study, less than half of providers used the recommended criteria for identifying overweight and obese children. Barlow (2007) called for BMI to be calculated annually. Speiser and team (2005) recommended that "all primary providers screen children for overweight and obesity" (p. 1879). King and team (2007) suggested that monitoring of children's height and weight should be added to routine care. Huang and associates (2011) noted that less than 50% of primary care physicians assess BMI percentiles regularly in children. O'Brien and colleagues (2004) described childhood obesity as under recognized among the providers in their study. In an Israeli study, Goldman and team (2004) found that only 13% of primary care

physicians routinely weighed children. Huang and colleagues (2011) also found "that a majority of overweight adolescents and parents of overweight children also reported that a healthcare provider had not informed them of their child's weight status" (p. 25). Providers reported their barriers for not addressing the overweight/obese issue as a sensitivity matter for the parent and child (McFarlane et al., 2009). McClintock and Hedge (2009) cited psychological and social factors as barriers to intervention.

With additional training, primary care offices can provide opportunities for weight loss (Ewing et al., 2009, 2+; Moodie et al., 2008, 1+; Spear et al., 2007, 1+; and Wake et al., 2008, 1+). Behavioral techniques such as motivational interviewing and motivation enhancement have been effective in promoting weight loss in children (Hughes & Reilly, 2008, 1+; Luttikhuis, et al., 2008, 1++; Sargent et al., 2011, 1+; and Tan-Ting & Llido, 2011, 2++). Education specifically on behavioral counseling would be beneficial to providers (Pollack et al., 2009, 2+).

Current guidelines in the management and treatment of the obese child are not strictly adhered to (Cretikos et al., 2003; O'Brien, et al., 2004, 2++; Siversten et al., 2008, 2+; and Traveras et al., 2007, 2+). Ewing (2009) noted surveys that revealed "many providers have not had training in treatment of overweight and, therefore, do not feel confident in counseling or managing their patients" (p. 397). In an Australian study, Cretikos and colleagues, (2008) noted that general practitioners do not utilize opportunities to manage the overweight and obese child. Cretikos and colleagues (2008) reported that general practitioners managed overweight and obesity once per 58 encounters with overweight or obese children. Providers generally were not addressing the issue of inactivity (O'Brien, et al., 2004). Traveras and team (2007) added that less

than half of youth surveyed reported discussing sugar- sweetened beverages or television viewing habits with their provider.

Recommendation III: Health care providers need to recognize that a combined structured multidisciplinary intervention for childhood obesity is most likely to result in decreased BMI and improved fitness. (Strength of evidence=A)

Successful weight management programs utilized a multidisciplinary approach (Bean et al., 2011, 2+; Cretikos et al, 2008, 2+; Diaz, 2010, 1-; Eliakim et al., 2004, 2+; Eliakim et al., 2002, 2+; Germann et al., 2006, 2+; Korsten-Reck et al., 2005, 2+; Nemet et al., 2008, 1-; Nowicka et al, 2008, 2+; Nowick et al., 2007, 2+; Skelton et al, 2008, 2+; Tan-Ting & Llido, 2011, 2++; Vanhelst et al, 2011, 1-; Vignolo et al., 2008, 2+; Woolford et al., 2010, 2+; and Woolford et al., 2011, 2+). A registered dietitian is a key member of the multidisciplinary team (Diaz et al., 2010, 1-; Eliakim et al., 2002, 2+; Grimes-Robison & Evans, 2008, 1++; Korsten-Reck et al., 2005, 2+; Reinehr et al., 2010, 1-; Skelton et al., 2008, 2+; Spear et al., 2007, 1+; Tan-Ting & Llido, 2011, 2++; Vignolo et al., 2008, 2+; and Weigel et al., 2008, 1+). The literature not only revealed the importance of the psychologist in behavioral counseling but also the importance of the exercise specialist. (Korsten-Reck et al., 2005, 2+; Skelton et al., 2008, 2+; Spear et al., 2007, 1+; and Tan-Ting & Llido, 2011, 2++). In order to provide comprehensive care, each team member's role is to focus on their specialties, allowing the primary provider to maintain medical management of the child and to continue to be supportive of the family (Spear et al., 2007, 1+).

Recommendation IV: Providers should integrate the key components of a successful

weight management program (increased physical activity, dietary modification, and decreased sedentary behavior) into their practice. (Strength of Evidence=A)

Through the combined efforts of increasing physical activity, making dietary changes, and promoting behavioral changes success in weight management can be achieved (Hughes & Reilly, 2008, 1+; Luttikhuis et al., 2008, 1++; Reinehr et al., 2009, 2+; Speiser et al., 2005, 1+; and Waters et al., 2011, 1++). The components of a multidisciplinary program address each of these issues (Eliakim et al., 2002, 2+; Eliakim et al., 2004, 2+; Grimes-Robison & Evans, 2008, 1++; Korsten-Reck, et al., 2005, 2+; Madsen et al., 2009, 2-; Reinehr et al., 2010, 1-; Skelton et al., 2008, 2+; Spear et al., 2007, 1+; Tan-Ting & Llido, 2011, 2++; Vanhlest et al., 2011, 1-; Vignolo et al., 2008, 2+; and Weigel et al., 2008, 1+). In studies reviewing the care in primary practices, attention was focused on lifestyle modification (August et al., 2008, 1+; Baker et al., 2010, 2++; Ewing et al., 2009, 2+; McCallum, et al., 2005, 1+; and Moodie et al., 2008, 1+). A decrease in BMI can be achieved with lifestyle modifications (Eliakim et al., 2002, 2+; Ewing et al., 2009, 2+; Korsten-Reck et al., 2005, 2+; Ranstrom, 2009, 2+; Reinehr, et al., 2010, 1-; and Whitlock et al., 2010, 1+).

Recommendation V: Health care providers should tailor weight management approach to the needs of the child and family, factoring in the degree of excess weight, health risk, motivation, and age of child. (Strength of Evidence= B)

Programs need to be tailored to the child and families' needs (Diaz et al., 2010, 1-; Fowler-Brown & Kahwati, 2004, 1-; McCallum et al., 2005, 1+; and Whitlock, 2010, 1+). The level of treatment depends on the child's condition. Spear and team (2007) described a structured approach involving four stages starting with counseling by the

primary provider and increasing intensity of intervention at each stage. Barlow (2007) noted stages two through four require more time and resources. The timing of the stages should fit the needs of the child. Research by Whitlock and colleagues (2010) confirmed a stepped-care approach in weight management of the child, adding that an increase in intensity is necessary as the child gains weight or has more health related consequences. Matyka and Malik (2008) added that motivation is crucial for interventions to be successful. "It is essential to find out how motivated the child and parents are to lose weight and whether either the child or parents are more motivated" (Matyka & Malik, 2008, p. 179.)

Recommendation VI: Health care providers should have a treatment goal of weight maintenance with a decline in BMI as the child grows. (Strength of evidence= B)

A successful obesity program for children should use BMI decline as an evaluator instead of weight loss (Hughes & Reilly, 2008, 1+ and Speiser et al., 1+). According to Hughes and Reilly (2008), "weight loss is an unrealistic goal" (p. 263). According to Matyka and Malik (2008), a developing child will accumulate weight due to an increase in stature;; therefore, a decrease in BMI rather than weight loss is more likely. Realistic goals for the obese child would be modest weight reduction or the prevention of further weight gain (Matyka & Malik, 2008). Speiser and colleagues (2005) noted that a reduction in BMI would be helpful in the prevention of short and long term consequences of obesity.

Summary

The principal recommendation of this evidence-based practice project is that parental involvement is imperative for weight loss in the overweight and obese child.

Other recommendations focus on the need for primary care providers to be educated on pediatric overweight and obesity to enhance their ability to assess and identify overweight and obese children and communicate the findings with the children and their parents. Additional recommendations discuss the keys to successful weight loss in children and the appropriate goals of care.

With the ever increasing population of obese children and the limited availability of specialty clinics, the primary care provider is left to manage and treat the obese child. The primary care provider is the resource of healthcare for many children and their families. This puts the primary provider in the position to take full advantage of every opportunity he or she has with the patient and family. The primary provider must not only be aware of the guidelines recommended by the American Academy of Pediatrics, but also adhere to them. BMI's must be assessed regularly and the child and their family made aware of the results and implications. Motivation to follow recommendations must be assessed and motivational interviewing must be utilized to encourage behavior change. Providers must be aware of specialists in the area, in particular dietitians, and establish a relationship that allows for referrals. The most effective way to be successful in a weight loss program is through dietary changes and an increase in physical activity. It is up to the primary care provider to encourage patients and families to adhere to these recommendations and yet tailor the recommendations to meet the individual needs of the patient and family.

CHAPTER 4

CONCLUSIONS AND RECOMMENDATIONS

Outcome Recommendation Based On Analysis

In examining the literature in order to determine evidenced based approaches in the management and treatment of pediatric obesity in primary care, various levels of evidence were discovered. A majority of the evidence emphasized the importance of parental involvement in the treatment and management of the overweight and obese child. The effectiveness of multidisciplinary support was also highlighted in the literature. The importance of lifestyle modification in the care of the overweight and obese child was emphasized in the evidence. Additional studies specific to the treatment and management of the obese child by the primary care provider need to be considered for future investigation.

The recommendations supported by Level 1++, Level 1+, Level 1+, and Level 2++ are considered reliable and valid. The recommendations are formed from information obtained from systematic reviews by Grimes-Robison and Evans (2008) and Luttikhuis and colleagues. (2008). In addition, several meta-analysis, systematic reviews, and RCTs were used to develop the recommendations: August et al. (2008); Baker et al., (2010); Barlow et al., (2007); Hughes and Reilly, (2008); Klein et al., (2010); McCallum et al., (2005); Moodie et al., (2008); Nichols et al., (2002); Reinehr et al., (2010); Spear et al., (2007); Tan-Ting and Llido (2011); Wake et al., (2008); Weigel et al., (2008); and Whitlock et al., (2010).

Recommendations also were supported by 2+ and 2- levels of evidence which reinforced the higher quality of evidence: (Allen et al., (2003); Cretikos et al., (2008); Eliakim et al., (2002); Ewing et al., (2009); Holt et al., (2011); Huang et al., (2011); Korsten-Reck et al., (2005); McFarlane et al., (2009); Ranstrom (2009); and Siversten et al., (2008)). The information was from case control or cohort studies and was published within the past 10 years. Evidence identified as level 3 and 4 which represented non-analytic studies, case reports, and expert opinions included: (Jacobson (2009); Madsen et al., (2009); Matyka & Malik, (2008); O'Brien et al., (2004); Reinehr et al., (2009); Shephard, (2004) Skelton et al., (2008); and Vignolo et al., (2008)). Level 3 and 4 evidence articles supplied additional support for the higher quality evidence.

Implications of Outcome on Practice

Obesity is a chronic condition that has reached epic proportions in the United States, causing a physical, psychological, and financial strain. In order to achieve improved health and wellness in an ageing population, obesity must be addressed in childhood. The American Academy of Pediatrics (Spear et al., 2007) and the USPSTF (Whitlock et al., 2010) recommended a staged approach for obesity treatment, including the referral to multidisciplinary obesity clinics. However, given the current and projected needs of the treatment, obesity clinics cannot be established quickly enough and residents in rural areas would be unlikely to have access to such a clinic (Spear et al., 2007). Primary care providers must be in a position to accept the burden of providing such care. The guideline produced for this project was created to assist primary care providers in proposing the best evidence-based practice in the management and treatment of childhood obesity. Action is necessary given the lack of "training and time to assess,

to modify, and to monitor obese patients' diet, physical activity, and behavioral habits properly" (Spear et al., 2007, p. S280). Huang and colleagues (2011) also noted that counseling on diet or weight status may be limited due to the "perceived level of ease by PCPs" (p. 31). As a result of using the guideline, improvement in care can be made to link the patient with the best practice treatment to manage obesity and prevent the long term consequences of obesity.

This guideline identifies the importance of behavior change, including parents, in the treatment and use of motivational interviewing techniques. However, coaching patients and parents in behavioral change lengthens the encounter, resulting in higher health care costs and limiting the number of patient encounters for the day. The primary provider must rely on ancillary staff to increase the level of obesity treatment services available to patients and their families (Huang et al., 2011). Providers must be willing to refer to dietitians, physical fitness experts, and psychologists as necessary in order to provide comprehensive care to the patient.

The importance of assessing for overweight and obesity was also identified in the guidelines. BMI should be assessed at every well child visit and "should serve as the starting point for the classification of health risks" (Barlow, 2007, p. S169). Health risks increase with advancing BMI. Diagnosis of overweight and obesity is the crucial first step in treating and managing the condition. Parents and children must be made aware of the diagnosis. Huang and colleagues (2011) identified an uneasiness with discussing weight-related issues as a barrier to care. Providers must overcome this obstacle and not only routinely perform BMI's, but also discuss the findings with the patient and parent.

Reimbursement for managing obesity is an obstacle for the primary care provider. The National Institutes of Health now recognize obesity as a disease. However, third-party payers in general do not reimburse for weight management services. Third-party payers are now being pressured to cover preventative interventions " (Spear et al., 2007). According to Spear and team (2007), an effort to lobby for insurance coverage of obesity is underway. In addition, "State and federal policymakers are evaluating which obesity treatments are effective and thus may qualify for Medicaid and Medicare reimbursement" (Spear et al., 2007, p. S280).

Efforts to increase provider training is an important part of a comprehensive public health policy to manage and treat the obese child. The AMA advocates the need to educate physicians about the prevention and management of pediatric obesity. The AMA specifically encourages education to focus on physical activity, nutrition assessment, and counseling methods (AMA, 2012). The American Medical Association is working with federal agencies, public health organizations, and medical societies to ensure that more physicians currently in practice, as well as those presently in medical school, are trained in the management of obesity in children and adults (Spear et al., 2007, p. S280).

Implication of Outcome on Research

The evidence is clear that increased activity and a reduced-calorie diet is essential in promoting weight loss or achieving ideal weight for height status, yet opportunities for additional research remain. The evidence does not address how to provide and promote the interventions at different levels of developmental stages. Effective strategies for long-term weight maintenance were not addressed. Steinbeck (2005) called for more

well designed clinical trials to improve the evidence base. Also, the literature did not address intervention approaches for specific ethnicities or religious groups. Family dynamics need further investigation. The need for parental involvement in the care of the overweight and obese child is evident in the literature. Additional questions remain regarding what family characteristics promote success in the treatment of pediatric obesity. Further research is necessary to determine why participants withdraw from pediatric weight management programs. In addition, research to reveal the potential psychological effects of the intervention is also necessary.

Further research needs to focus on the primary care provider and the delivery of the intervention. The success of telemedicine is crucial given the rising numbers of pediatric obesity and the limited availability of specialists to counsel the patients. Spear and team (2007) referred to a weight management intervention program where the adolescent participated in counseling sessions via telephone and mail in addition to physician office visits. The adolescents lost more weight and reported higher levels of satisfaction than those receiving the usual care. Spear and team (2007) also noted a South Dakota study of primary care providers and adult patients participating in a medically monitored, multidisciplinary weight management program. "Preliminary results indicate that weight loss, improvement in comorbid conditions, and patient satisfaction are comparable to those of patients participating in the same treatment at the tertiary care center" (Spear et al., 2007, p. S279). Studying the same approach in children could revolutionize pediatric obesity care, making it accessible in all areas of the country.

Randomized control trials are needed to evaluate the effectiveness of individual programs in order to determine the most successful approach. The development of

standardized diet and physical assessment tools would enhance the validity and reliability of intervention research.

Implications for Nursing Education

An assessment of the nursing curriculum is necessary to identify weaknesses and strengths as it relates to the treatment and management of the obese child. The literature revealed that education was lacking in health care in general as to how to manage the obese child. Nursing students should be taught how to recognize obesity and how to address the obesity issue with parents and children. Student nurses need to understand the comorbidities and health consequences related to pediatric obesity.

Advanced practice registered nurses need additional evidence-based education in assessing and counseling obese children and their caregivers. This education would be appropriate in the pathophysiology, assessment, and pediatric course programs. Obesity is a chronic condition that has tripled in our pediatric population. Proper management of the condition must be maintained to curb the obesity crisis.

Motivational interviewing was identified in the literature as a mechanism to promote healthy interventions. In order to change behavior, providers must be able to assess readiness for change and motivation to behavioral changes. Walpole, Dettmer, Morrongiello, McCrindle, and Hamilton (2011) describe motivational interviewing "as a method of therapy found to resolve ambivalence, enhance intrinsic motivation and promote confidence in a person's ability to make behavior changes" (p.1). Not only would advanced practice nurses benefit from using the motivational interviewing technique in the overweight and obese child, but also with other clients in need of behavior change to improve health outcomes. Currently Bean, Mazzeo, Stern, Bowen

and Ingersoll (2011) and Walpole and colleagues (2011) are studying the efficacy of motivational interviewing in the treatment of pediatric obesity. As of this writing the findings have not been released.

Implications for Policy

Enacting and enforcing health care policies that impact overweight and obesity and overweight need to be considered. Obesity has an economic impact. Finkelstein, Trogdon, Cohen, and Dietz (2009) estimated the total cost of obesity in 2008 was approximately $147 billion. This included direct medical costs such as hospitalization and medical care and also indirect costs such as loss of work. Policymakers have an additional incentive to consider the obesity and overweight as legislative issue. According to Christeson, Taggart, and Messner-Zidell (2010) a growing number of potential recruits are being rejected for military duty because of their overweight/obese status.

Mechanisms for combating childhood overweight and obesity have already been defined by government officials. Recommendations to combat obesity on a local level are clearly defined in *Recommended Community Strategies and Measurements to Prevent Obesity in the United States* (Khan et al., 2009). The 24 strategies target six distinct issues:

> 1) strategies to promote the availability of affordable healthy food and beverages, 2) strategies to support healthy food and beverage choices, 3) a strategy to encourage breastfeeding, 4) strategies to encourage physical activity or limit sedentary activity among children and youth, 5) strategies to create safe

communities that support physical activity, and 6) a strategy to encourage communities to organize for change. (Khan et al., 2009, summary)

The Task Force on Childhood Obesity was created in 2010 develop a coordinated effort among private institutions and the government to address the issue of childhood obesity by creating an action plan and by developing policies (US Department of Education, 2010).

Let's Move! is an initiative spearheaded by First Lady Michele Obama to combat childhood obesity. The initiative includes educating parents and caregivers and promoting healthy decisions, targeting schools to provide nutritious meals, making healthy foods affordable, and promoting physical activity (Let's Move.gov/about, n.d.). Since its beginning on February 9, 2010 several collaborative efforts have been announced. Disney will require all food and beverage products advertised on their media and served at their theme parks to meet federal nutritional standards by 2015. The Department of Defense is updating their nutritional standards. Blue Cross Blue Shield funded Play Streets, offering city streets where children and families can be physically active without fear of traffic (Let's Move.gov/accomplishments, n.d.).

Organizations like Eat Smart Move More target obesity prevention efforts on a state and local level (Eat Smart Move More South Carolina, 2013). The organization works to impact not only policies but also environmental changes that encourage people to turn to healthier alternatives. Eat Smart Move More promotes a healthy lifestyle in the workplace, home, and school by developing partnerships with local state agencies, businesses, community groups, and schools (Eat Smart Move More South Carolina,

2013). States including North Carolina and South Carolina have coalitions working on the county level.

Limitations

I identified limitations in the literature that impact the treatment provided and the accuracy of the data. Although each intervention stressed behavioral changes, treatment approaches were different. The population, intervention intensity, setting, and outcome assessed varied. Some studies identified BMI change, while other authors identified BMI SDS which adjusted for age and sex. Many of the studies were from self-reported data. The data may have been skewed given their perspectives of the quality of care they provided and as Reinehr and colleagues (2010) noted "under-reporting is a well-known phenomenon in obese subjects" (p. 335). Many of the studies had relatively small sample sizes and high drop-out rates. Also, the studies did not specifically address the social status of the population. Social status may impact motivation for completing the programs. The literature also identified short-term results from the interventions. More investigation is needed to corroborate the long-term results.

General Recommendations

Health care providers must recognize the seriousness of obesity and work to educate the patients and their caregivers on methods to enhance healthy weight management. However, providers must be willing to do more than deliver the message. Providers need to follow their own advice and adhere to the recommendations they make to patients and their families. Providers should serve as role models for their patients. Health care providers need to engage in community outreach activities to bring the issue of pediatric obesity to the forefront. Providers must serve as advocates for their patients,

engaging policy changes at the local, state, and federal level that would assist the overweight and obese child in adopting a healthier lifestyle. With multidisciplinary clinics in limited supply and primary care providers having limited opportunities for weight management counseling, additional avenues must be sought to reach the children and their parents. These opportunities could also serve to maintain success achieved in clinics (Korsten-Reck et al., 2005). Opportunities for collaborating among disciplines must be sought out to provide the highest quality of care to the overweight and obese child.

Summary

The evidence-based practice project addressing the PICO question "What are the best practices for the treatment of overweight and obese children to achieve a decrease in BMI in pediatric primary care?" found quality evidence that supports the importance of primary care providers incorporating these recommendations to improve the treatment and management of pediatric obesity. A search of various databases, including, but not limited to CINAHL Plus, PubMed, and the Cochrane Library and also the *Journal of the American Academy of* Pediatrics provided a foundation in addressing the treatment of the overweight and obese child in the primary care setting. The prevailing themes includes family involvement in the treatment plan and also tailoring of treatment to meet the needs of the child and family. In addition providers need to adhere to current recommended practices in order to identify and manage the overweight and obese child. Treatment should follow a multidisciplinary approach, addressing physical activity, dietary modification, and decreased sedentary behavior with the goal of weight maintenance with a decline in BMI as the child grows. The implication on primary care practice includes

longer office visits to incorporate motivational interviewing or coaching. Nursing education should offer additional opportunities for the student to learn how to address the obesity issue with parent and child. Policymakers need to enact and enforce polices that will impact childhood overweight and obesity. Future research needs to address the benefits of telemedicine in the management of the obese child and the challenge of motivating the parent and child.

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APPENDIX A: EVIDENCE TABLE

TABLE A.1 EVIDENCE TABLE

Brief Citation/ Level of Evidence	**Research Design/ Type and Number of Studies**	**Purpose of the Study**	**Internal Validity/ Methods**	**Main Results**	**Recommendations/ Limitations**
1) Allen et al. (2003). A survey of obesity management practices of pediatricians in New Jersey. **Level: 2-**	Descrip-tive survey	To examine obesity management practices and factors that influence New Jersey pediatricians.	Survey of 424 New Jersey pediatricians.	Obstacles included patient engagement and provider time. Methods to improve obesity management included education materials, pediatric obesity sessions, and provider reimbursement.	No limitations discussed. Recommendations: Dietitians seen as a valuable resource.

Brief Citation/ Level of Evidence	Research Design/ Type and Number of Studies	Purpose of the Study	Internal Validity/ Methods	Main Results	Recommendations/ Limitations
2) August et al. (2008). Prevention and treatment of pediatric obesity: an endocrine society clinical practice guideline based on expert opinion. **Level: 1+**	Guidelines. The Task Force was composed of a chair, selected by the Clinical Guidelines Subcommittee (CGS) of The Endocrine Society, eight additional experts, one methodologist, and a medical writer. Taskforce	To prepare evidence-based recommendations for the treatment and prevention of pediatric obesit.	Task force used the Grading of Recommendations Assessment, Development, and Evaluation method to evaluate the literature. Extensive references cited.	Description of definition of obesity. Prevention and treatment methods discussed.	Limitations not discussed in review. Authors did note that the Task Force elected to make strong recommendations for many issues where the evidence base was low or of low quality. Recommendations: Lifestyle modification is essential for any treatment.

Brief Citation/ Level of Evidence	Research Design/ Type and Number of Studies	Purpose of the Study	Internal Validity/ Methods	Main Results	Recommendations/ Limitations
	used systematic reviews to make recommendations.				
3) Baker et al. (2010). Evaluation of the overweight/obese child-practical tips for the primary health care provider: Recommendations from the childhood obesity task force of the European Association for the study of obesity.	Expert opinion.	To assist primary care providers in the diagnosis and treatment of the overweight and obese child.	Methodology not discussed in length. Reference made to guidelines being an evidence-based approach. Literature review not discussed.	Tips for assessment and counseling the overweight child involve provider taking a thorough history and taking particular note of nutritional status and physical activity. Parental involvement crucial.	Recommendations: Primary care providers are not only important for motivating and educating families, but also provide support in behavior modification. No limitations discussed.

Brief Citation/ Level of Evidence	Research Design/ Type and Number of Studies	Purpose of the Study	Internal Validity/ Methods	Main Results	Recommendations/ Limitations
Level: 4				Encourage realistic goals and expectations for the child.	
4) Banks et al. (2011). Barriers engaging families and GPs in childhood weight management strategies **Level: 3**	Non-RCT	To identify obese children from general practice. The obese child would be encouraged to follow-up with their primary care provider. Referral to childhood obesity specialists considered.	Letters were sent to families explaining that the child's BMI was higher than normal. Parents were encouraged to discuss the child's BMI with their provider. 285 letters were sent out. 134 patients responded.	Less than 17 % of the invited families participated in a weight-related office visit. Less than 9% of the children were referred to obesity specialists.	Recommendations: Providers need to consistently record BMI data and identify the obese child. Additional research is needed to identify methods to involve families and obese children in assisting weight management. Limitations: Small data set. Not all children had BMI data recorded, thus not all obese children in the practice identified. Consultations were captured from provider note. It is not known

Brief Citation/ Level of Evidence	Research Design/ Type and Number of Studies	Purpose of the Study	Internal Validity/ Methods	Main Results	Recommendations/ Limitations
					what extend weight was discussed.
5) Barlow (2007). Expert committee recommendations regarding the prevention, assessment, and treatment of child and adolescent overweight and obesity. **Level: 1+**	Systematic review. Guideline. Number and types of studies not specifically addressed.	To provide recommendations in pediatric obesity care.	The committee rated the evidence. Guideline addressed study question. Literature search was not described in detail.	Providers can impact the course of pediatric obesity in the areas of prevention, assessment and treatment.	Limitation: Effective strategies remain poorly defined. The scarcity of studies about the process of obesity treatment precluded an evidence review. Recommendations: Additional research needed in pediatric obesity management. Providers can utilize patient-centered counseling techniques, screen for medical conditions and risk factors, and utilize the four stages of obesity care.
6) Bean et al. (2011). Six-month dietary	Community based pilot	To assess dietary changes in	Sixty seven obese adolescents completed height	Improvements were noted in body mass and	Limitations: No control group. Dietary recall not reliable. Low

Brief Citation/ Level of Evidence	Research Design/ Type and Number of Studies	Purpose of the Study	Internal Validity/ Methods	Main Results	Recommendations/ Limitations
changes in ethnically diverse, obese adolescents participating in a multidisciplinary weight management program. **Level: 2+**	study.	obese adolescents.	and weight measurements at baseline and after six months of participating in an outpatient multidisciplinary weight management program. Twenty-four hour diet recall and fasting lipid profiles were also collected at baseline and six months later.	lipid profiles. A reduction in total fat, saturated fat, carbohydrate, and sodium intake was also noted.	participation. Recommendations: Outpatient multidisciplinary treatment participants can make dietary changes that lead to improved dietary intake and overall improved general health.
7) Bennett & Sothern. (2009). Diet, exercise, behavior: the promise and limits of lifestyle change. **Level: 4**	Opinion.	To identify lifestyle changes such as dietary, physical activity, and behavioral modification and determine how they are	Methodology not discussed.	Multidisciplinary intervention should include dietary, physical activity and behavioral aspects. Parental involvement is crucial.	Limitations: Limited data from pediatric population. Recommendations: Additional research is needed to evaluate intervention strategies.

Brief Citation/ Level of Evidence	Research Design/ Type and Number of Studies	Purpose of the Study	Internal Validity/ Methods	Main Results	Recommendations/ Limitations
		integrated as part of multidisciplinary treatment in obese youth.			
8) Carrel & Allen (2005). Off the growth curve: the challenge of childhood obesity. **Level: 4**	Opinion	To review the necessary medical evaluation and common causes of childhood obesity and to examine an existing multidisciplinary in treating childhood obesity.	Methodology not discussed.	Details multidisciplinary approach at the Pediatric Fitness Clinic.	Limitations: Not discussed. Perspective on one program. Recommendations: An effective approach for prevention and treatment of childhood obesity must be a collaborative effort.
9) Cretikos et al. (2008). General practice management of overweight and obesity in	Cross-sectional study	The purpose of this study was to review Australian general practice	3978 Australian general practitioners had 42,515 encounters with children and adolescents for a	Providers dealt with overweight and obesity issues in 215 patient visits, and once out of	Limitations: Selection bias. May not be generalized to other countries.. Recommendations: General practitioners

Brief Citation/ Level of Evidence	Research Design/ Type and Number of Studies	Purpose of the Study	Internal Validity/ Methods	Main Results	Recommendations/ Limitations
children and adolescents in Australia. **Level: 2+**		management of overweight and obese children and adolescents, describing the prevalence and rate of management.	four year period. Data collected included encounter content and prevalence of overweight and obesity.	58 visits with overweight or obese children. The reason for the office visit for the obese or overweight child was weight issues. These children were often treated for additional diagnoses such as depression. The office visits for the overweight and obese child were longer that the average visit.	need to take advantage of opportunities to manage and teat the overweight and obese child.
10) Delgado-	Systemati	To identify	Databases search	The AGREE	Limitations: Many of

Brief Citation/ Level of Evidence	Research Design/ Type and Number of Studies	Purpose of the Study	Internal Validity/ Methods	Main Results	Recommendations/ Limitations
Noguera et al. (2009). Quality assessment of clinical practice guidelines for the prevention and treatment of childhood overweight and obesity. **Level: 1+**	c review. 376 references identified. 22 references were selected for further review.	and evaluate clinical practice guidelines for childhood obesity and overweight prevention and treatment	included MEDLINE for clinical practice guidelines.	instrument was used to in evaluating the guideline, resulting in six clinical practice guidelines recommended. An additional eight were recommended with conditions.	the recommendations were not evidence-based. Recommendations: Access to recommendations from the best available guidelines is a necessity for the clinician.
11) De Niet et al. (2011). Somatic complaints and social competence predict success in childhood overweight treatment. **Level: 2+**	Prospectiv e study	To define predictors of treatment success by monitoring body mass index scores in a family based multidisciplin ary by lifestyle	Two hundred forty eight children overweight and obese children and their caregivers participated in a lifestyle intervention program. Children were	Children of Caucasian parents had greater reduction in bmi standard deviation scores and higher child behavior checklist scores. In addition, younger	Limitations: Other factors may have influence treatment success. Recommendations: Baseline screening for child characteristics could offer assistance in tailoring treatment programs to children.

Brief Citation/ Level of Evidence	Research Design/ Type and Number of Studies	Purpose of the Study	Internal Validity/ Methods	Main Results	Recommendations/ Limitations
		intervention program.	between the ages of 8 and 14.	children, children with lower child behavior scores, and children of parents with lower bmi scores were more successful in reducing bmi.	
12) Diaz et al. (2010). Lifestyle intervention in primary care settings improves obesity parameters among Mexican youth. **Level: 1-**	RCT	To compare lifestyle intervention with a primary care physician aided by registered dietitian and a behavioral curriculum to a brief primary care physician encounter in the treatment of pediatric	Seventy-six obese youth participated in a 12 month trial. Intervention group participated in a lifestyle program involving family participation, consults with a registered dietitian, 12 sessions of a behavioral curriculum and monthly primary care physician	Forty-three participants completed. The intervention/ lifestyle group had significant decrease in weight and bmi as compared to the control group.	Limitations: High dropout rate. Recommendations: Primary care physicians can provide a successful strategy for treating pediatric obesity when supported by a registered dietitians and a behavioral curriculum. Cost effective analysis necessary to determine if such programs are practical in the primary care setting.

Brief Citation/ Level of Evidence	Research Design/ Type and Number of Studies	Purpose of the Study	Internal Validity/ Methods	Main Results	Recommendations/ Limitations
		obesity in the primary care setting.	visits. Control group participated in monthly 10 to 15 minute consultations with a primary care physician.		
13) Eliakim et al. (2004). Parental obesity and higher pre-intervention BMI reduce the likelihood of a multidisciplinary childhood obesity program to succeed--a clinical observation. **Level: 2+**	Non-Randomized Controlled Trial	To evaluate the effectiveness and identify predictors of success of a multidisciplinary pediatric obesity program.	Seventy-seven obese children participated in a 12 month structured dietary and exercise intervention. Thirty seven served as controls	The intervention group had a significant decrease in BMI. The control gained weight.	Limitations: Ethnicity, socioeconomic status, and method of recruitment were not well defined. Low completion rate. Recommendations: Program model has the potential to be effective in long-term obesity management. Research needs to be conducted to substantiate the long-term effectiveness.
14) Eliakim et al (2002). The effect of a combined intervention on	Longitudinal, non-randomized, clinical	To assess the effectiveness of a weight management	Methodology discussed in detail. Literature review not	At 3 months the intervention group was noted to have	Limitations: Study presents short term effects. Selection bias a possibility.

Brief Citation/ Level of Evidence	Research Design/ Type and Number of Studies	Purpose of the Study	Internal Validity/ Methods	Main Results	Recommendations/ Limitations
body mass index and fitness in obese children and adolescents—a clinical experience. **Level: 2+**	experience.	program for obese children and adolescents.	described. One hundred seventy-seven youth completed a 3 month combined dietary and exercise program. Twenty-five students served as controls.	experienced significant weight loss, reduced BMI, decreased TV viewing, and improved fitness. The control group gained weight, increased their BMI, did not change TV viewing habits, and demonstrated less improved fitness.	Recommendations: A structured multidisciplinary program for childhood obesity is effective in promoting weight loss, decreased body mass index, and improved fitness. Additional studies for the long term effectiveness is needed.
15) Ewing et al. (2009). Translating evidence-based interventions for	Trial study	To provide pediatric healthcare providers with the training to	Two pediatric offices received training in assessment and treatment of the	Minimal weight loss was achieved. Children who attend at least 6	Limitations: High dropout rate and low participation. Recommendations:

Brief Citation/ Level of Evidence	Research Design/ Type and Number of Studies	Purpose of the Study	Internal Validity/ Methods	Main Results	Recommendations/ Limitations
pediatric overweight to a primary care setting. **Level: 2+**		address the following topics with parents concerning their children; weight, body mass index, diet and physical activity.	obese child and in motivational counseling. Then 73 child/parent combination participated in an intervention consisted of 11 sessions. The first eight occurred weekly and the remaining occurred monthly.	intervention sessions and 1 of the follow-up session lost an average of 2.84 lb.	Overweight children can be successfully treated in primary care offices.
16) Fowler-Brown & Kahwati (2004). Prevention and treatment of overweight in children and adolescents. **Level: 1-**	Systematic Review. Additional studies were considered if primary goal was overweight	To discuss effective prevention and treatment strategies with the purpose of achieving the Healthy People 2010 goal of a 50%	Searches included MEDLINE (OVID) Cochrane, National Institutes of Health, and National Guideline Clearinghouse.	No evidence-based overweight prevention guidelines were identified. One set of guidelines was identified for treatment of pediatric	Limitations: Nine studies met authors' criteria. Effectiveness of weight loss interventions in childhood and adolescence not well studied. Small number of participants examined.

Brief Citation/ Level of Evidence	Research Design/ Type and Number of Studies	Purpose of the Study	Internal Validity/ Methods	Main Results	Recommendations/ Limitations
	prevention or treatment. Further studies reviewed included RCT, observational studies, and expert opinion by medical panels or organizations.	reduction in pediatric obesity.	Secondary searches included bibliographies of review articles specifically addressing pediatric overweight prevention.	overweight.	Recommendations: No one weight loss intervention has been proven superior. Interventions must meet the specific needs of the child and family.
17) Germann et al. (2006). Long-term evaluation of multi-disciplinary treatment of morbid obesity in low-income minority adolescents: La	Cohort study	To assess the long-term effects of a multidisciplinary treatment program in morbidly obese, low-income, minority	One hundred fifty adolescents participated in a cognitive-behavior therapy, nutritional education, medical monitoring, and formal exercise	Nineteen participants attained clinically significant weight change.	Limitations: Small sample size. Recommendations: Intensive treatments programs may provide more successful outcomes.

Brief Citation/ Level of Evidence	Research Design/ Type and Number of Studies	Purpose of the Study	Internal Validity/ Methods	Main Results	Recommendations/ Limitations
Rabida Children's Hospital's Fit Matters program. **Level: 2+**		adolescents.	training program. Eighty-three returned for the follow-up.		
18) Goldman et al. (2004). Physician's attitude toward identification and management of childhood obesity in Israel. **Level: 3**	Cross-sectional study	To assess the attitudes of primary care physicians in Israel toward the identification and management of pediatric obesity.	One hundred forty-four Israeli primary care physicians completed anonymous questionnaire.	Thirteen percent of providers routinely weigh children. Interventions recommended by the providers included dietitian referral (92%), physical exercise (85%), and group therapy (27%). Seventy-eight percent of providers were unfamiliar with the new Expert Committee recommendations released in 1998.	Limitations: Not discussed. Small sample size. Recommendations: A comprehensive education program needs to be implemented to prevent and treat obesity.

Brief Citation/ Level of Evidence	Research Design/ Type and Number of Studies	Purpose of the Study	Internal Validity/ Methods	Main Results	Recommendations/ Limitations
19) Grimes-Robison & Evans (2008). Benefits and barriers to medically supervised pediatric weight-management programs. **Level: 1++**	Systematic review	To review literature pertaining to the pros and cons of implementing a medically supervised pediatric weight-management programs.	Literature search included CINAHL, Health Source, Medline, PubMed, and PsychInfo. Search terms included 'pediatric weight-management,' 'obesity and children,' and 'medically supervised weight management for children.'	Reviews the programs that are effective and the perceived barriers that families contend with in following treatment plans.	Limitations: Few studies collected data on the perceptions of health care, providers, family involvement, or the motives for not completing programs. Recommendations: Additional research addressing the rationale behind program dropout.
20) Haemer et al. (2011). Building capacity for childhood obesity prevention and treatment in the medical community: call	Expert opinion.	To provide methods to support change in primary practice in the prevention and treatment	Literature review not discussed.	Collaboration between treatment programs and primary care providers is necessary. Primary care	Limitations: None identified. Recommendations: Providers need to improve screening efforts in order to prevent and treat

Brief Citation/ Level of Evidence	Research Design/ Type and Number of Studies	Purpose of the Study	Internal Validity/ Methods	Main Results	Recommendations/ Limitations
to action. **Level: 4**		of pediatric obesity.		providers benefit from adhering to current obesity prevention and treatment guidelines.	childhood obesity and adhere to current guidelines.
21) Henes et al. (2010). Medical nutrition therapy for overweight youth in their medical home: The KIDPOWER experience. **Level: 2-**	Retrospective chart review	To ascertain the practicality and impact of applying a standardized medical nutrition therapy (MNT) protocol in the treatment of overweight children.	Retrospective chart review of 109 patients that completed at least three MNT visits in the rural southern community of Pitt County, NC.	The protocol delivered by a RD assisted youth in behavior modification that resulted in weight loss.	Limitations: Selection bias. Recommendations: Additional studies are needed to determine if these changes are long-lasting.
22) Holt et al. (2010). Primary care practice addressing child overweight and obesity: A survey	Descriptive survey	To gain an understanding of the attitudes and practices in regards to	Questionnaires were sent to physicians in primary care clinics. Only 36 physicians	Physician's reported that overweight and obesity in children need to be addressed;	Limitations: Small sample size. Bias a possibility. Recommendations:

Brief Citation/ Level of Evidence	Research Design/ Type and Number of Studies	Purpose of the Study	Internal Validity/ Methods	Main Results	Recommendations/ Limitations
of primary care physicians at four clinics in Southern Appalachia. **Level: 3**		pediatric obesity of primary care physicians in Southern Appalachia.	returned the questionnaires.. Literature review not discussed.	however physicians' play a limited role in prevention or intervention.	Additional provider training in obesity and overweight management may influence providers to be more proactive. .
23) Hopkins et al. (2011). How can primary care providers manage pediatric obesity in the real world? **Level: 4**	Meta-analysis	To provide primary care providers a toolkit for the primary care provider for the management of pediatric obesity.	Literature review not discussed in detail. Review included guidelines and original studies.	Lifestyle modification interventions can be tailored for youth. Toolkit for pediatric obesity management provided.	Limitations: Not discussed. Recommendations: Primary providers can initiate and manage ongoing interventions using current guidelines. Involvement of family may increase success rate.
24) Huang et al (2011). Pediatricians' and family physician's weight-related care of children in the US.	Non-analytic	To survey primary care pediatric physician providers regarding their efforts to prevent	Survey of 811 pediatricians and family practice physicians sampled from AMA.	Less than 50% of those surveyed BMI percentiles regularly in children. Eighteen percent of all	Limitations: It is unknown if patient characteristics differ among the two groups.. Regional differences noted. No standardized diet and physical activity assessment

Brief Citation/ Level of Evidence	Research Design/ Type and Number of Studies	Purpose of the Study	Internal Validity/ Methods	Main Results	Recommendations/ Limitations
Level: 3		inappropriate pediatric weight gain.		PCPS referred their patients.. Family physicians were less likely to assess weight status and provide behavioral counseling than pediatricians.	tools. . Self-reported data. Recommendations: Need for more active PCP participation in assessment or management of childhood obesity in the primary care setting.
25) Hughes & Reilly (2008). Disease management programs targeting obesity in children: Setting the scene for wellness in the future. **Level: 1+**	Meta-analysis	To provide a summary of the evidence on diagnosis, prevalence, and health consequences of childhood obesity and the effectiveness of treatment programs.	Review of systematic reviews and RCTs findings from non-randomized controlled trials Methodology not discussed in detail.	Childhood obesity has significant health risks in both the short and long term. High-quality evidence on the management of pediatric obesity is limited. Successful approaches to	Limitations: High-quality evidence is limited. Recommendations: Key components of a successful weight management program include addressing physical activity and reducing sedentary behavior and dietary modification. Parental involvement and

Brief Citation/ Level of Evidence	Research Design/ Type and Number of Studies	Purpose of the Study	Internal Validity/ Methods	Main Results	Recommendations/ Limitations
				treat pediatric obesity are widely available.	behavioral techniques are also important elements.
26) Irby et al. (2010). Motivational interviewing in a family-based pediatric obesity program: A case study. **Level: 3**	Case study	To demonstrate the application of motivational interviewing within a family based, multidisciplinary treatment program.	Mother and 14 year old daughter participated in the Brenner FIT Program.	After 4 months in program patient had a reduction of BMI from 35 to 33.6.	Limitations: MI effectiveness in this field untested. No standard exists for multidisciplinary delivery of MI. Recommendations: Additional studies involving different ethnic groups and effectiveness on long term weight loss.
27) Jacobson & Melnyk (2012). A Primary Care Healthy Choices Intervention Program for Overweight and Obese School-	Pilot study	To pilot test a comprehensive Cognitive Theory-based Healthy Choices Intervention (HCI)	Seventeen overweight and obese children aged 9 through 12 and their parents participated in a 7-week pretest posttest	Participants reported the weekly cognitive behavior skills building to be helpful. Children were	Limitations: Small sample size. Recommendations: This pilot study supports the intervention with overweight and obese

Brief Citation/ Level of Evidence	Research Design/ Type and Number of Studies	Purpose of the Study	Internal Validity/ Methods	Main Results	Recommendations/ Limitations
Age Children and Their Parents. **Level: 3**		program with overweight and obese children and their parents.	intervention study. Outcome measures included weight and body mass index (BMI), BMI percentile, physical activity and nutrition knowledge among social indicators.	noted to have decreased BMI and increased awareness. Parents experienced increased knowledge and decreased anxiety.	children and their parents in a primary care setting. Need RCT to provide additional analysis of the HCI.
28) Jelalian et al. (2003). Survey of physician attitudes and practices related to pediatric obesity. **Level: 3**	Descriptive survey	To survey physicians regarding their attitudes and practices related to the treatment of pediatric obesity in a primary care setting.	Surveys were sent to physicians who were members of the American Academy of Pediatrics and the American Academy of Family Physicians practicing in the Southern New England area.	Twenty-five percent of physicians reported that they are not at all or only slightly competent, while 20% report feeling not at all or slightly comfortable	Limitations: The sample may not be representative of pediatricians and family practice physicians. No ethnic diversity. Self-reported data only. Relationship between physician attitudes and practices and patient response not addressed.

Brief Citation/ Level of Evidence	Research Design/ Type and Number of Studies	Purpose of the Study	Internal Validity/ Methods	Main Results	Recommendations/ Limitations
			Survey had the following focus: attitudes towards obesity, treatment and referral approaches, and barriers to addressing weight concerns in children and adolescents.	with addressing obesity. Physicians may be more likely to address obesity with children and adolescents who are significantly overweight.	Recommendations: Physicians would benefit from additional training and education with regards to pediatric obesity and how to effectively address pediatric obesity in the primary care setting.
29) King et al. (2007). Australian GPs' perceptions about child and adolescent overweight and obesity: the weight of opinion study. **Level: 3**	Qualitative study	To examine the perception of general practitioners (GP's) about overweight and obesity in children and adolescents.	Group of 26 GPs in 3 metropolitan and 1 rural area of New South Wales, Australia.	The perception of the GPs is that parents are sensitive in the area of pediatric overweight and obesity. Providers responses were varied mixed regarding behavioral intervention. Some providers preferred to refer lifestyle	Limitations: Small sample size. Selection bias. Recommendations: Develop resources to support GPs that provide lifestyle counseling. Regular monitoring of all children's weight and height.

Brief Citation/ Level of Evidence	Research Design/ Type and Number of Studies	Purpose of the Study	Internal Validity/ Methods	Main Results	Recommendations/ Limitations
				and behavior change counseling while others provided the service.	
30) Klein et al. (2010). Adoption of body mass index guidelines for screening and counseling in pediatric practice. **Level: 2-**	Survey	To study pediatrician implementation of BMI measurements and interventions for pediatric overweight prevention and treatment.	Data were obtained from AAP Periodic Survey of Fellows No. 65. Surveys mailed to 1622 non retired US AAP members. Literature review not disclosed.	Ninety-nine percent reported obtaining height and weight at well-child visits, and 97% visually assess for overweight at most or every well-child visit. Fifty-two percent respondents calculate BMI in children over the age of two. Most described a lack of time to	Limitations: Several opportunities for bias. Participants may be more interested in obesity prevention and treatment. More female respondents returned the survey. Recommendations: BMI-percentile screening in primary pediatric practice is underused. Increased awareness of national guidelines.

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				counsel on overweight and obesity and added that counseling has poor results.	
31) Korsten-Reck et al. (2005). Frieburg intervention trial for obese children (FITOC): results of a clinical observation study. **Level : 2+**	Longitudinal nonrandomized clinical observation study	To test the effectiveness of the Freiburg FITOC obesity intervention program.	Data collected from 496 children that participated in physical exercise program three times a week and comprehensive dietary and behavioral education. Thirty-five children did not participate and served as the control. Methodology was	BMI decreased after intervention. LDC-C decreased significantly in both sexes of intervention group. HDL increased in intervention group. Fitness level increased in intervention group. No significant changes in total	Limitations: No limitations discussed. Small control group. Recommendations: Obese children can be successfully treated in an outpatient treatment program.

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			detailed. Literature search was excluded.	cholesterol, LDL-C, or HDL-C in control group.	
32) Luttikhuis et al (2008). Interventions for treating obesity in children. **Level: 1++**	Systematic review.	To assess the efficacy of interventions for treating childhood obesity.	Search included CENTRAL on The Cochrane Library Issue 2 2008, MEDLINE, EMBASE, CINAHL, PsycINFO, ISI Web of Science, DARE and NHS EED. Data from 1985 to May 2008. References were checked. No language restrictions.	Reduction in overweight at 6 and 12 months follow up in after lifestyle interventions involving children; and lifestyle interventions in adolescents with or without the addition of pharmaceuticals.	Limitations: Limited quality data to recommend one treatment program to be over another. Recommendation: A combined behavioral lifestyle interventions compared to standard care or self-help can produce reduction in overweight in children and adolescents.

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33) Madsen et al. (2009). A clinic-based lifestyle intervention for pediatric obesity: Efficacy and behavioral and biochemical predictors of response. **Level: 2-**	Retrospective chart review	To examine effectiveness and identify predictors of response to a lifestyle intervention for obese youth.	Chart review of 214 children and adolescents aged 2-19 seen in the Weight Assessment for Teen and Child Health Clinic. After initial visit, patients were seen for follow-up at 3 month intervals. Addressed PICO.	Decrease in BMI. Response of child at the initial visit helped predict success of lifestyle intervention	Limitations: Poor follow-up. Bias associated with self-reported behavioral variables. Study may have lacked the statistical power to identify other predictors of response. Recommendations: Clinic based interventions are effective in decreasing BMI. Additional study with longer follow-up. .
34) Matyka & Malik. (2008). Management of the obese child—application of	Journal article	To describe the approach to management of an obese	Methods not discussed.	Framework for management of the obese child.	Limitations: Not specifically addressed. Little detail of the role of secondary care.

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NICE guidelines of 2006. **Level: 4**		child using the NICE guidelines and personal practice from a secondary care weight management clinic.			Recommendations: The involvement of specialist may lead patients to believe that obesity is a problem that they cannot manage. Leave specialists to provide screening services for both the causes and consequences of obesity.
35) McCallum et al. (2005). Can Australian general practitioners tackle childhood overweight/obesity? Methods and processes from the LEAP (Live, Eat and Play	RCT	To determine if GPs can effectively provide intervention to families with overweight and/or obese children ages	Thirty-four GPs from 29 family medical practices attended training sessions on management of childhood overweight. The intervention focused on encouraging	After completing the LEAP trial 27 providers reported feeling more capable of treating childhood obesity and 22 believed they could make a	Limitations: Not specifically addressed. Recommendations: Primary Many families are agreeable to work with their GP to manage childhood overweight/obesity. GPs and families can participate in trials to

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randomized controlled trial. **Level: 1+**		5 to 9-.	behaviors such as increased activity, decreased fat intake.. Intervention was delivered in four sessions over the course of 12 weeks.	substantial difference to children's weight. Of the eligible 163 (40%) were participated in the LEAP RCT; 96% of intervention families attended at least their first consultation.	determine the effectiveness of interventions.
36) McClintock & Hedge. (2009) Child and adolescent obesity: Assessment, management and treatment by practitioners in the Waikato	Descriptive survey	To identify current strategies in the assessment, management, and treatment of childhood obesity used by primary	Questionnaires completed by 56 general practitioners and child health specialists out of 250 questionnaires sent out.	Although providers were concerned with childhood obesity published guidelines were not adhered to. Reasons cited included	Limitations: Low response rate. Recommendations: Increased use of tools to assess childhood obesity and provide appropriate interventions. Consider psychological

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region. **Level: 3**		care health professionals in the New Zealand Waikato region.		psychological and social factors as barriers to intervention implementation.	intervention.
37) McFarlane et al. (2009). General practitioner and pediatrician self-reported capacity for the diagnosis and management of childhood and adolescent overweight and obesity. **Level: 3**	Descriptive study	To assess providers' self-reported capacity in the management of pediatric overweight and obesity.	Forty general practitioners and three pediatricians were interviewed, using a 27 question survey with both open-ended questions and question utilizing the Likert scale. Literature review not included.	Only 23% of providers adhered to current guidelines. Most were unaware of dietary services available in the community. .	Limitations: Poor provider response. Small sample size. Self- reported data. Recommendations: Providers may benefit from more opportunities for training in clinical practice management guidelines and counseling tools. Providers need to be aware of local tools to assist in the treatment of pediatric obesity.
38) Moodie et al.	RCT	To assess	Methodology	This	Limitations: Small

Brief Citation/ Level of Evidence	Research Design/ Type and Number of Studies	Purpose of the Study	Internal Validity/ Methods	Main Results	Recommendations/ Limitations
(2008). Cost-effectiveness of a family-based GP-mediated intervention targeting overweight and moderately obese children. **Level: 1+**		cost-effectiveness of a family-based GP-mediated intervention targeting overweight and moderately obese children.	discussed in detail. Drivers of variability discussed.	intervention was cost-effective for 9 months under current assumptions, with only a 9.5% chance that the intervention would result in higher costs no benefits.	study. No definitive data on evidence of efficacy.. Recommendations: Additional studies needed.
39) Nemet et al. (2005). Short-and long-term beneficial effects of a combined dietary-behavioral-physical activity intervention for the treatment of childhood	Randomized prospective study	To investigate the short- and long- term effects of a dietary, behavioral, and physical activity intervention on obese children.	Twenty-four obese subjects completed the 3-month intervention and were compared with 22 obese, control subjects. Participants met with a dietitian six times during	At three months there were significant changes in body weight, body fat percentage, serum cholesterol levels, and fitness in the intervention	Limitations not discussed. Recommendations: The benefits of a combined dietary, behavioral, and physical activity intervention has both short term and long term effects on weight

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obesity. **Level: 1-**			the program and participated in a twice weekly one hour training program.	group versus the control group. After one year there continued to be a significant difference between intervention group and control group in weight and body fat percentage. An increase in physical activity was noted among the intervention group compared with a decrease in the control subjects.	loss, BMI, and improved fitness. Multidisciplinary programs are effective in the treatment of childhood obesity.
40) Nemet et al. (2008). Treatment of childhood obesity in obese	RCT	To examine the effects of an intense family based	Twenty-two obese children were randomly assigned to the	Intervention group had a significant improvement in	Limitations: Small sample size. Recommendations:

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families. **Level: 1-**		dietary, behavioral, and physical activity intervention for obese children from obese families.	intervention group or the control group with no intervention.	fitness level and significant difference in change in body weight, BMI, and screen time compared to control group.	Family oriented multidisciplinary weight management programs should be designed for pediatric obesity treatment.
41) Nichols et al. (2002). Preventing pediatric obesity: assessment and management in the primary care setting. **Level: 4**	Literature review and opinion	To review the literature on and examine the responsibility of the primary care provider in treating overweight children.	Data sources included selected research, national guidelines and recommendations. Expert knowledge of the authors provided additional l data source.	Detailed assessment parameters and interventions for the overweight child.	Limitations: None identified. Rationale for data sources not discussed. Recommendations: Obesity prevention should be discussed with parents at every well-child visit. Treatment is indicated when patterns of weight gain exceed parameters for age and gender. Additional

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					research on prevention necessary.
42) Nowicka. (2005). Dietitians and exercise professionals in a childhood obesity treatment team. **Level: 4**	Expert opinion	To focus on nutritional counseling and physical activity and how health professionals can address these factors in a multidisciplinary team.	Methodology not discussed.	Nutritional counseling and physical activity programs have to be tailored individually to meet each family's needs and to maintain compliance.	Limitations: None identified. Recommendations: Focus efforts on developing obesity prevention and treatment models. The obese child should be assessed and treated by a multidisciplinary team, including a physician, dietitian, exercise expert, nurse, and behavioral therapist.
43) Nowicka et al. (2008). Family weight school treatment: 1-year results in obese adolescents.	Controlled clinical trial	To evaluate the effectiveness of a Family Weight School treatment	65 adolescents in the intervention group and 23 in the control group. Intervention group participated in a Family Weight School	90% group completed the program. Participants with a mean BMI of 33 showed a significant	Limitations: Study is non- blinded. Patients on the waiting list are motivated to lose weight. Recommendations: Family weight school

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Level: 2+			therapy program in group meetings provided by a multidisciplinary team. Control group received no intervention and were on the program waiting list	decrease in BMI z scores.	treatment model might be useful for obese adolescents.
44) Nowicka et al. (2007). Low intensity family therapy is useful in a clinical setting to treat obese and extremely obese children. **Level: 2+**	Case study	To assess the impact of family therapy on body mass index z-scores and self-esteem of obese children.	Fifty-four obese children aged 6-17 and their families received therapy provided by a multidisciplinary team including a pediatrician, dietician/ sports trainer, a pediatric nurse, and a family therapist.	Interventions resulted in decrease in BMI and improvement in self-esteem..	Limitations: Lack of a control group. Reduction in BMI could be attributed to other factors. Small sample size. Recommendations: Low intensity family therapy provided by a multidisciplinary team to obese children not only improves self-esteem but also improves weight loss. . Long term studies are necessary utilizing

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					RCTs to further ascertain the influence of family therapy as a treatment of pediatric obesity.
45) O'Brien et al. (2004). Identification, evaluation, and management of obesity in an academic primary care center. **Level: 3**	Retrospective medical record review	To provide direct assessment of pediatric clinicians' performance in obesity identification and management.	Provider's progress notes of 2515 visits to Children's Hospital of Pittsburgh Primary Care Center during a 3 month period were inspected for the following: adequate diet history, history of physical activity and/or television viewing, obesity notation in the problem list, intervention provided and follow up monitoring.	Providers documented obesity assessments in only 53% of the visits. An account of the child's television viewing habits and activity level was noted in 15% of the charts	Limitations: Documentation of health care providers may not adequately portray the provider's observations of the patient nor may it accurately depict the family and patient discussions. Recommendations: Primary care providers need for heightened awareness of the importance of detection of obesity.

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46) Pietrobelli et al. (2009). Pediatric obesity: Looking into treatment. **Level: 4**	Opinion	To provide a framework for the treatment of pediatric obesity that may be applicable in the primary care setting.	Not applicable.	Outcomes can be improved with early identification and structured guidance.	Limitations: Lack of a clear program to address the precise needs of overweight and obese children. Recommendations: Further research needed to understand the advantages of interventions and when they are most effective.
47) Pollak et al. (2009) Primary care physician's discussions of weight-related topics with overweight and obese adolescents: Results from the teen CHAT pilot study.	Pilot cohort study	To assess the quantity, quality, and effectiveness of motivational interviewing quality discussions between physicians and overweight adolescents.	Sixteen physicians and 30 patients participated. Parents and patients consent were obtained. Audio recordings of physician-adolescent encounters. Outcomes monitored included fat reduction	Providers that were more likely to adhere to motivational interviewing was the older, normal-weight female, older, physicians and pediatricians. With motivational interviewing patients exercised more,	Limitations: Small sample size. Nested analyses not conducted. Results may not be generalized to other settings . Recommendations: Physicians should be trained in motivational interviewing to effectively foster behavior change in adolescents.

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Level: 2+			behaviors, exercise, screen time, sleep, and self-reported weight by 1 month after encounter.	experienced weight loss, and reduced screen time.	
48) Raj & Kumar. (2010). Obesity in children and adolescents. **Level: 4**	Opinion	To discuss the phenomena of pediatric obesity and identify options in obesity treatment.	Not applicable.	Provided guidelines for treatment and prevention of obesity.	Limitations: Significant deficiencies in the efficacy of interventional programs. Recommendations: A holistic approach including diet, physical activity and cognitive change is necessary to treat pediatric obesity.. In addition community leaders and policymakers need to be involved.
49) Ranstrom	Prospectiv	To discuss the	Twenty youth	The program	Limitations: Small

Brief Citation/ Level of Evidence	Research Design/ Type and Number of Studies	Purpose of the Study	Internal Validity/ Methods	Main Results	Recommendations/ Limitations
(2009). Taking steps together: A family centered lifestyle, education and behavioral modification program for overweight and obese children and their families. **Level: 2 +**	e study.	success of family centered behavioral modification programs in the treatment childhood obesity.	aged 7-17 participated in a family centered intervention that used behavioral modification and lifestyle education to assist primary care providers in pediatric overweight and obesity treatment.	was effective in improving health related behaviors over a short period of time.	sample size. Recommendations: Need additional study on the long term effects.
50) Rausch et al. (2011). Obesity prevention, screening, and treatment: Practices of pediatric providers since the 2007 expert committee	Cross sectional anonymou s survey.	To identify current practices (prevention, screening, and counseling) of pediatric providers in an academic medical	Ninety-six providers at 5 community-based, hospital-affiliated general pediatrics and family medicine practices providers completed a	Less than half of the providers used the recommended criteria for identifying children who are overweight and obese. The majority of	Limitations: Results are self- reported. Low response rate. The population the providers predominately saw was a low-income, Latino and Black population and may not be representative of other

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recommendation. **Level: 2-**		center as it involves pediatric obesity.	survey to evaluate their adherence to the guidelines of the 2007 American Medical Association and Centers for Disease Control and Prevention Expert Committee Recommendations.	providers felt their counseling was ineffective. Wide variability in referral patterns.	populations. Recommendations: More efforts are needed to standardize approach to the management of overweight and obese children.
51) Reinehr et al (2009). Medical care of overweight children under real life conditions: The German BZgA observation study	Observational study.	To observe the current process of care for overweight children and outcomes under real-life conditions.	1916 overweight children who participated in lifestyle interventions from 48 institutions were included in this study.	Majority of children (75%) had a reduction in their weight status.	Limitations: Children were not randomized to the different treatment approaches. Age, degree of overweight, and motivation could influence results. No control group. Screening for comorbidities was not performed as

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Level: 2+					recommended. Recommendations: Overweight reduction is achievable with lifestyle intervention in clinical practice. Quality criteria for institutions have to be implemented to improve treatment of overweight children.
52) Reinehr et al. (2010). An effective lifestyle intervention in overweight children: findings from a randomized controlled trial on "Obeldicks light."	Randomized controlled trial	To validate the effectiveness of lifestyle interventions in overweight children.	Methodology included randomized to control group (32 overweight children) and intervention group (34 overweight children). Literature not	The lifestyle intervention was associated with an improvement of dietary patterns and was effective in reducing degree of overweight, fat mass, waist	Limitations: Small sample size. Children lost to drop out may have affected the results. Bias possible due to self-reported data such as dietary records and questionnaires. Other factors not considered in this study such as

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Level: 1-			detailed but references comprehensive.	circumference, and blood pressure, while the control group experienced no significant changes .	parental BMI may have impacted the findings. Recommendations: Assess the cost-effectiveness of the intervention. Long term follow-up studies need to be completed.
53) Sargent et al. (2011). Components of primary care interventions to treat childhood overweight and obesity: a systematic review of effect. **Level: 1+**	Systematic review	To identify interventions that treated childhood overweight or obesity and explore factors of those interventions associated with successful outcomes.	Database search of MEDLINE, CINAHL, EMBASE, Cochrane Reviews, CENTRAL, DARE, PsychINFO, and ERIC. Search strategy described in detail. 22 papers were included. 12	Primary care can be effective in treating childhood overweight and obesity. Provider training is crucial. Motivation enhancement techniques utilized.	Limitations: Database search only included published literature. Unable to analyze detailed comparisons between interventions. Recommendations: Interventions are practical for primary care to implement.

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			studies reported at least 1 significant intervention effect.		
54) Shephard (2004). Role of the physician in childhood obesity. **Level: 4**	Expert opinion	To make recommendations to the practicing physician in examining and treating childhood obesity.	Methodology not given in detail. Relevant articles in Medline and personal files.	The most effective intervention in managing pediatric obesity is a combined approach of increased lifestyle activities, less sedentary behavior, and dietary modification.	Limitations: Not addressed. Recommendations: Monitoring body mass index and skinfold thickness in all patients will aid the pediatric physician in the management of pediatric obesity. . Interventions should be provided to children above the 50th percentile of body fat.
55) Siegel et al. (2009). A 6-	Uncontrolled	To determine the efficacy of	Seventy-one obese children	84% lost weight. Mean	Limitations: No control group. Most of

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month, office based, low-carbohydrate diet intervention in obese teens. **Level: 2+**	Clinical Trial	a low-carbohydrate diet in obese children in a primary care pediatric setting.	ages 12-18 were put on a diet of less than 50 grams of carbohydrate daily. Thirty-eight out of 63 teens finished the 6 month study.	BMI decreased from 34.9 to 32.5.	the participants were girls. Intake and compliance was self-reported. Low participation. Participants that completed may have been more motivated to lose weight. Recommendations: The low-carbohydrate diet is an effective and practical intervention for obese teens.
56) Sivertsen et al. (2008). Diagnosis and management of childhood obesity: A survey of general practitioners in	Descriptive study	To describe general practitioners' diagnosis and management pediatric overweight and obesity,	Survey of 85 participants. Literature review not examined in detail.	Majority of providers prescribed the correct interventions, however, there was variability in	Limitations: Small sample size. Recommendations: Need for greater community awareness of pediatric obesity. General practitioners cannot bear the

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South West Sydney. **Level: 2+**		including the practitioners beliefs about pediatric obesity and the providers knowledge of current management guidelines.		complications screening, ranging from 75% screening for psychosocial problems to 30% for fatty liver. Twenty-eight percent of GPs used NHMRC guidelines in their practice and only 9% diagnosed obesity using body mass index charts.	responsibility of managing pediatric obesity alone.
57) Skelton, et al. (2008). A pediatric weight management program for hi-	Descriptive study	To find out if a multidisciplinary pediatric weight	Chart review of 66 children in the NEW Kids Program.	Decrease in BMI z-score noted after the intervention. Improvements	Limitations: Sample size and change in BMI was small. Results may have been skewed due to subjects being

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risk populations: A preliminary analysis. **Level: 3**		management intervention can successfully be implemented for at high-risk populations and yield decrease in BMI		also noted in total cholesterol, low-density lipoprotein, and triglyceride levels.	lost to follow up or did not completed the program. Recommendations: A multidisciplinary pediatric weight management program can be an effective tool to improve the weight status of high-risk youth.
59) Sola et al. (2010) An activity-based intervention for obese and physically inactive children organized in primary care: feasibility and impact on fitness and BMI A one-year follow-up	Prospective, longitudinal study	To investigate the practicality and influence on an intervention for obese and inactive children in a primary care setting.	Forty week structured intervention based on physical training with lifestyle advice for the obese child and a parent. Sixty-two physically inactive children aged 6-14 participated.	49 children completed the first 6 months. 37 completed 12 months. After 12 months BMI reduced and physical fitness improved. Dropout was higher in children whose	Limitations: Dropout was significant. No control group. Boys and girls grouped together. Recommendations: Parental compliance is vital.

Brief Citation/ Level of Evidence	Research Design/ Type and Number of Studies	Purpose of the Study	Internal Validity/ Methods	Main Results	Recommendations/ Limitations
study. **Level 2+**				parents were inactive or did not participate in the physical activity portion.	
58) Spear et al. (2007). Recommendations for treatment of child and adolescent overweight and obesity. **Level: 1+**	Systematic review. Guideline.	To review evidence about the treatment of pediatric obesity.	Literature search used not clearly described.	Provided an algorithm for care.	Limitations: Clinical trials were not able to determine the effectiveness of individual strategies. Recommendations: A comprehensive four step approach for weight management intervention is necessary.
60) Speiser et al. (2005). Consensus statement: Childhood Obesity	A group of 65 physicians and other health professionals representing nine	To explore the available evidence and develop a consensus for future management.	Methodology not discussed in detail. Literature review not described. Participants were divided into groups reviewing prevalence,	Algorithm for assessment and treatment.	Limitations: None noted. Recommendations: Measures to prevent childhood obesity are listed in and basic lifestyle interventions are summarized.

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Level: 1-	countries deliberated the public health crisis that is pediatric obesity.		causes, risks, prevention, diagnosis, treatment, and psychology associated with pediatric obesity. Each group researched the literature and developed a draft document that was debated over the three day meeting and then brought to the full group for discussion.		
61) Steinbeck (2005) Treatment options. **Level: 4**	Commentary	To review treatment opportunities for the obese child.	Methodology not discussed.	Behavioral changes included dietary changes emphasizing lower fat intake	Limitations: Limited evidence base. Recommendations: Long term studies are needed.

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				and smaller portion sizes and increasing physical activity and decreasing sedentary behaviors. Parental participation a must.	
62) Tan-Ting & Llido (2011). Outcome of a hospital based multidisciplinary weight loss program in obese Filipino children. **Level: 2++**	Prospective study.	To analyze the outcome of a three month multidisciplinary intervention that consist of dietary, exercise, and behavioral methods in obese children.	Fifteen month study of 44 obese children.	Children exhibited a decrease in weight, BMI, BMI z-score, body fat, systolic blood pressure, and waist circumference at the conclusion of the program.	Limitations: Small sample size. Low completion rate. Thirteen percent of patients completed all 24 sessions. Seventy-two percent completed 12 or more sessions. Recommendations: Encourage participation in program. Weight loss was directly related to the number of sessions attended.

Brief Citation/ Level of Evidence	Research Design/ Type and Number of Studies	Purpose of the Study	Internal Validity/ Methods	Main Results	Recommendations/ Limitations
63) Taveras et al. (2007). Youths' perception of overweight-related prevention counseling at a primary care visit. **Level: 3**	Survey	To examine youths' perception of receiving overweight-related preventive counseling and perceived readiness to adopt behavior change as advised by their providers.	324 youth aged 10-18 who had a physical exam within the past year were surveyed. Survey questions comprised of questions regarding height, weight, race, mother's education, and issues discussed with their provider during the primary care visit.	Less than 50% reported discussing sugar-sweetened beverages or television viewing with their providers. Youth whose mothers did not have more than a high school education were less likely to report receiving counseling on any overweight-specific topic. Youth aged 10-14 were more likely than older youth to report they would try to change TV viewing if recommended	Limitations: Bias due to youth recalling events that may have taken place one year before. Sample limited to a convenience sample. Providers of or frequency of medical care were not disclosed. Recommendations: Emphasis may need to be place on lessening social class discrepancies in counseling for overweight prevention. Younger children may be more open to counseling to prevent overweight.

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				by a provider.	
64) Trowbridge et al. (2002). Management of child and adolescent obesity: study design and practitioner characteristics. **Level: 3**	Descriptive study.	To examine the personal characteristics and methods of health care providers in the assessment and treatment of pediatric overweight and obesity.	Needs assessment questionnaire. The questionnaire comprised of 35 questions split among 3 topic areas and was distributed to a sample of 1088 pediatricians, 879 pediatric nurse practitioners and 1652 dietitians.	Some significant differences were noted amongst practitioner characteristics.	Limitations: Low response rate. Personal characteristics of practitioners might affect their approach to the management of obesity. Recommendations: Providers be aware of the variance in practitioner characteristics in regard to gender, years of practice, body mass index, and obesity related behaviors.
65) US Preventive Services Task Force. (2010). Screening for	Guidelines	To update the 2005 US Preventive Services Task Force	Methodology not discussed in detail.	Moderate to high-intensity programs showed a decrease in	Limitations: Longer term follow-up is needed to confirm maintenance and to ascertain longer-term

Brief Citation/ Level of Evidence	Research Design/ Type and Number of Studies	Purpose of the Study	Internal Validity/ Methods	Main Results	Recommendations/ Limitations
obesity in children and adolescents: US preventive services task force recommendation statement. **Level: 1+**		statement about pediatric screening for overweight .		BMI 12 months after the beginning of the intervention. The interventions involved more than 25 hours of contact with the child and/or family over a 6-month period.	risks and harms. Recommendations: Screen children age 6 and older for obesity. Provide or refer the child for comprehensive, intensive behavioral interventions.
66) van Gerwen et al. (2009). Primary care physicians' knowledge, attitudes, beliefs and practices regarding childhood obesity: a systematic review	Systematic review	To gain insight into the belief systems of primary care physicians in regard to childhood obesity in order to implement interventions to manage	Database search from 1987-2007. 130 articles assessed and 11 articles analyzed.	Physicians agreed on the importance of treating childhood obesity. Providers believed they were not efficient in the obesity management. The importance	Limitations: Although the studies had different focuses, the findings were assumed to represent primary care physician's knowledge, attitudes, beliefs, and practices regarding childhood obesity. Selection bias. Recommendations: Primary providers need

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Level: 1+		obesity.		of using body mass index as a tool has increased A common theme among the studies: dietary counseling, exercise, or referral to a dietitian.	education to improve consistency of pediatric obesity assessment and to improve effectiveness in managing childhood obesity. Multidisciplinary treatment recommended. Four step approach recommended.
67) Vanhelst et al. (2011) Effects of a multidisciplinary rehabilitation program on pediatric obesity: the CEMHaVi program**.** **Level: 1-**	Controlled clinical trial	To assess effects on BMI and blood pressure in youth after attending of a one year health and wellness program.	Thirty-nine children served as controls, thirty-seven were assigned treatment involving physical activity that put emphasis on playing games. Sessions were offered weekly for 2 hours each session for 12 months. Health	BMI decreased in treatment group and increased in controls. No significant difference in blood pressure.	Limitations: Small sample size. Recommendations: Obese youth experience health benefits from exercise and health education.

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			education was also given. Controls received physician care only.		
68) Vignolo et al. (2008). Five year follow-up of a cognitive-behavioral lifestyle multidisciplinary programme for childhood obesity outpatient treatment. **Level: 2+**	Longitudinal observational study	To examine the 5 year follow-up results of a cognitive behavioral program.	Thirty-one obese children ages 6-12 on admission. Intervention provided by a multidisciplinary team which included a pediatrician, cognitive-behavioral psychologist, and physical therapist. Parents were involved. The program utilized cognitive behavioral techniques, nutrition education, physical activity	Subjects who completed the follow-up had a decrease in BMI and waist circumference. Participants described improvement in social skills and emotional well-being.	Limitations: The small sample size and lack of control group are limiting factors. Recommendations: Treatment programs combining a lifestyle centered approach, parental involvement, nutrition education, and cognitive-behavioral strategies yield positive results for the obese child.

Brief Citation/ Level of Evidence	Research Design/ Type and Number of Studies	Purpose of the Study	Internal Validity/ Methods	Main Results	Recommendations/ Limitations
			promotion, and encouraged free play.		
69) Viner & Nicholls. (2005). Managing obesity in secondary care: a personal practice. **Level: 4**	Opinion	To provide guidance to pediatric health care providers on the assessment and management of pediatric obesity	Authors described the way they work with obese children and adolescents. at Greet Ormond. The approach involves using International Obesity Taskforce parameters to identify obesity and using a multidisciplinary program.	Goal of treatment in growing children is weight maintenance which results in BMI reduction.	Limitations: Not described. Recommendations: Diet, exercise, behavior modification, and other family based treatments appear to be the most suitable interventions in the treatment of childhood obesity. Programs need to be tailored to fit the needs of the child.
70) Wake et al. (2008). Economic evaluation of a primary care trial to reduce weight gain in	Randomized Control Trial	To record the costs sustained by families after primary care pediatric obesity	Twenty-nine family medical practices in Melbourn, Australia participated. Medical records	The intervention resulted in higher health care costs. BMI and daily activity scores	Limitations: Selection bias of the general practitioners. Possible overestimation of health care costs. Recommendations:

Brief Citation/ Level of Evidence	Research Design/ Type and Number of Studies	Purpose of the Study	Internal Validity/ Methods	Main Results	Recommendations/ Limitations
overweight/obese children: The LEAP trial. **Level: 1+**		interventions.	were audited and parents were given a questionnaire to report family resource use. Outcome measures consisted of BMI changes and parent reported lifestyle habits in intervention group as compared to a control children.	at 15 month of intervention did not differ significantly compared with control group. Improvement was noted in the dietary habits of the intervention group.	Additional research is needed to evaluate the cost-effectiveness of pediatric obesity programs.
71) Waters et al. (2011). Interventions for preventing obesity in children.	Systematic review	To assess the effectiveness of interventions designed to prevent obesity in	Randomized controlled trials and controlled clinical trials with minimum duration twelve weeks.	Programs were effective at reducing obesity. No evidence of adverse outcomes was	Limitations: Not enough evidence from trials to prove that any one particular program can prevent obesity in children.

Brief Citation/ Level of Evidence	Research Design/ Type and Number of Studies	Purpose of the Study	Internal Validity/ Methods	Main Results	Recommendations/ Limitations
Level: 1++		childhood through diet, physical activity and/or lifestyle and social support.	MEDLINE, PsycINFO, EMBASE, CINAHL and CENTRAL were searched from 1990 to February 2005. Reviewed by two independent reviewers. Twenty-two studies were analyzed. Participants were under 18 and living in Asia, South America, Europe or North America. Non-English language papers were included and	found	Recommendations: Comprehensive strategies to address including dietary and physical activity change, in addition with psychosocial support and environmental change may help prevent childhood obesity. Need long-term data. Need to consider cost of prevention measures.

Brief Citation/ Level of Evidence	Research Design/ Type and Number of Studies	Purpose of the Study	Internal Validity/ Methods	Main Results	Recommendations/ Limitations
			experts contacted.		
72) Weigel et al. (2008). Childhood obesity: concept, feasibility, and interim results of a local group-based, long-term treatment program. **Level: 1+**	RCT	To assist obese youth in establishing a health-oriented lifestyle in a group-based program	73 obese patients age 7 to 15. 37 participated for the 1-year intervention. Intervention consisted of 2 sessions a week in which elements for physical activity, nutritional education, and coping strategies were reviewed. Parents participated in monthly meetings. Control group	A reduction of BMI z score in the active treatment group but not for controls. The intervention group continued to have health benefits 12 months after beginning the intervention.	Limitations: Limited number of participants. Recommendations: Group- based programs can be an effective tool for n promoting a lifestyle changes and decreasing obesity for children and adolescents.

Brief Citation/ Level of Evidence	Research Design/ Type and Number of Studies	Purpose of the Study	Internal Validity/ Methods	Main Results	Recommendations/ Limitations
			only received handouts, relying on their own initiative to lose weight.		
73) Whitlock et al. (2010). Effectiveness of weight management interventions in children: A targeted systematic review for the USPSTF **Level: 1+**	Systematic review of 2786 abstracts and 369 articles led to a finale product of 15 trials.	To examine the benefits and harms of interventions for overweight and obese children and adolescents.	Methodology detailed with literature search sufficiently rigorous using various high quality electronic databases.	Behavioral interventions can be effective in treatment of overweight and obese youth.	Limitations: Small samples sizes, high drop-out rates, and diverse treatment approaches. Recommendations: A step wise approach as described by the Expert Committee which calls for the intensity of the interventions to increase as the degree of obesity increases.
74) Woolford et al. (2010). Physicians' Perspectives on Referring Obese Adolescents to Pediatric	Descriptive survey.	To identify factors that might prompt physician's to refer obese adolescents to multidisciplin	Survey of 375 pediatricians and 375 family physicians.	Physicians desired a program that incorporated diet, activity, and behavioral therapy. . Data	Limitations: Sixty-seven percent response rate. Referrals limited by availability of programs. Recommendations:

Brief Citation/ Level of Evidence	Research Design/ Type and Number of Studies	Purpose of the Study	Internal Validity/ Methods	Main Results	Recommendations/ Limitations
Multidisciplinary Weight Management Programs. Level: 3		ary weight management programs.		suggest physicians may be hesitant to refer and delay referral..	Initiatives to improve adolescent obesity management should address provider referral patterns.
75) Woolford et al. (2011). Results from a clinical multidisciplinary weight management program. **Level: 2+**	Cohort study. Data is.	To explore the effect of the intensive, clinical, multidisciplinary weight loss program on BMI and percent body fat, over the course of 24 weeks.	Retrospective analysis of data from 67 obese adolescents enrolled in an outpatient weight management program from April 2007 to June 2008 .	A mean decrease in BMI of 2.3 units for those that completed the program. Mean reduction of 0.7 BMI units for patients that did not complete the program.	Limitations: No comparison group. Long-term effects of program are unknown. Recommendations: A clinical multidisciplinary weight loss program for adolescents can lead to improvement in BMI.

APPENDIX B

LEVELS OF EVIDENCE

1++	High quality meta-analyses, systematic reviews of RCTs, or RCTs with a very low risk of bias
1+	Well conducted meta-analyses, systematic reviews, or RCTs with a low risk of bias
1 -	Meta-analyses, systematic reviews, or RCTs with a high risk of bias
2++	High quality systematic reviews of case control or cohort studies High quality case control or cohort studies with a very low risk of confounding or bias and a high probability that the relationship is causal
2+	Well conducted case control or cohort studies with a low risk of confounding or bias and a moderate probability that the relationship is causal
2 -	Case control or cohort studies with a high risk of confounding or bias and a significant risk that the relationship is not causal
3	Non-analytic studies, eg case reports, case series
4	Expert opinion

Adapted from Scottish Intercollegiate Guidelines Network. (2008). *SIGN 50: A guideline developer's handbook.* Retrieved from http://www.sign.ac.uk/pdf/sign50.pdf.

APPENDIX C

GUIDELINE FOR EVALUATION OF EVIDENCE

Section One:

Did the study address the PICO question?

Section Two: Internal Validity

Did the study address an appropriate and clearly focused question?

Did the study include a description of the methodology?

Is the literature search sufficiently rigorous to identify all the relevant studies?

Did the study assess and take into account the study quality?

Were there enough similarities between the studies selected to make combining them reasonable?

Section Three: Overall Assessment of the Study

How well was the study done to minimize bias? Code ++, +, or –

If coded as + or -, what was the likely direction in which bias might affect the study results?

Adapted from Scottish Intercollegiate Guidelines Network. (2008). Methodology checklist 1: Systematic Reviews and Meta-Analysis. Retrieved from http://www.sign.ac.uk/guidelines/fulltext/50/checklist1.html

APPENDIX D

GRADES OF RECOMMENDATION

A	At least one meta-analysis, systematic review, or RCT rated as 1++, and directly applicable to the target population; or A body of evidence consisting principally of results
B	A body of evidence including studies rated as 2++, directly applicable to directly applicable to the target population, and demonstrating overall consistency of results; or Extrapolated evidence from studies rated as 1++ or 1+
C	A body of evidence including studies rated as 2+, directly applicable to the target population and demonstrating overall consistency of results; or Extrapolated evidence from studies rated as 2++
D	Evidence level 3 or 4; or Extrapolated evidence from studies rated as 2+

GOOD PRACTICE POINTS

Recommended best practice based on the clinical experience of the guideline development group

Adapted from Scottish Intercollegiate Guidelines Network. (2008). *SIGN 50: A guideline developer's handbook.* Retrieved from http://www.sign.ac.uk/pdf/sign50.pdf