

Answer Guide for *Medical Nutrition Therapy: A Case Study Approach* 5th ed.

Case 1 – Pediatric Weight Management

I. Understanding the Disease and Pathophysiology

1. *Current research indicates that the cause of childhood obesity is multifactorial. Briefly outline how genetics, environment, and nutritional intake might contribute to the development of obesity in children.*

Biological (genetics and pathophysiology):

- 30%-75% of adiposity in children is related to genetics
- In children < 3 years of age, the strongest predictor of adulthood obesity is parental obesity
- Both prenatal undernutrition and overnutrition appear to increase lifelong risk for obesity
- Genetic/hormonal: Some of the most common are:
 - Prader-Willi syndrome
 - Cushing's syndrome
 - Hypo-/hyperthyroidism

Environmental (sedentary behaviors, SES, modernization, culture, dietary intake):

- Video and computer games and cable and satellite television have made sedentary activities more appealing
 - 98% of children in the U.S. live in homes with at least one television
 - 80% of children live in homes with at least one DVD player
 - Half of the children who live in the U.S. have at least one video game system in their homes
 - On average, children spend 3 hours per day watching television
- African American and Hispanic children participate in fewer vigorous activities and/or more sedentary activities than Whites
- Girls are less physically active than boys
- Dietary factors
 - Low intake of vegetables and fruits
 - High intake of fast foods and sweets
 - Increased consumption of sugar-sweetened soft drinks
 - Skipping breakfast
 - Increased consumption of refined carbohydrates (ready-to-eat cereals, potatoes, cakes, biscuits, soft drinks)
 - Increased parental work hours influence (leads to higher consumption of energy-dense foods)
 - Consumption of all 3 meals leads to 63% lower risk of being overweight/obese
- Mother smoking during pregnancy; increased risk of being overweight
- Extensive food marketing towards children (via video games, internet, TV, cell phones, etc.)

Global (society, community, organization, interpersonal, individual):

- Community design focused on cars has discouraged walking and bike riding
- Increased concerns about safety limit times and areas in which children play outside
- Time in physical education classes in schools has decreased
- Limited number of parks and recreation areas in communities

2. *Describe one health consequence for obese children affecting each of the following physiological systems: cardiovascular, orthopedic, pulmonary, gastrointestinal, and endocrine.*

- Orthopedic
 - Abnormalities affecting feet, legs, hips
 - Slipped capital femoral epiphysis
 - Blount's disease (bowing of lower legs & tibial torsion)
- Neurological
 - Pseudotumor cerebri (increased pressure in skull)
 - Recurrent headaches
- Pulmonary
 - Asthma

- o Sleep disorders
- o Sleep apnea
- Gastrointestinal
 - o Cholecystitis
 - o Hepatic steatosis
 - o Gallstones
- Endocrine
 - o Type 2 DM
 - o Polycystic ovary syndrome (PCOS)
 - o Hirsutism
 - o Acne
 - o Acanthosis nigricans
 - o Early puberty & menarche
- Psychological
 - o Low self-esteem
 - o Depression
 - o Peer rejection
- Cardiovascular
 - o Hypertension
 - o Hyperlipidemia

3. *How does Jamey's current weight status affect her risk of developing adulthood obesity?*

4. *Jamey has been diagnosed with obstructive sleep apnea. What is obstructive sleep apnea? Explain the relationship between sleep apnea and obesity.*

- Sleep apnea literally means “sleep without breath.”
- It is diagnosed in individuals who experience periods (at least 10 seconds) of not breathing for a variety of reasons.
- In the case of Jamey, obstructive sleep apnea is caused by the collapse of soft tissue in the throat, which effectively blocks her air passage.
- Strong correlations exist between weight and occurrence of sleep apnea, especially with the size of a person’s neck and visceral fat.
- Larger neck sizes put a strain on the airway, and visceral fat puts pressure on the lungs, decreasing lung function (although the function is not decreased during waking periods at rest).
- Additionally, Jamey may have tonsillar hypertrophy (another factor to consider with sleep apnea).

II. Understanding the Nutrition Therapy

5. *In general, what are the goals for weight loss in the pediatric population? Are there concerns to consider when developing recommendations for an overweight child who is still growing?*

- Since children are still growing in height, weight-loss goals should be realistic and should not necessarily attempt to fully normalize weight.
- For children at risk for overweight with no identified complications, maintenance of current weight is recommended. Prolonged maintenance will allow a gradual decline in BMI units as children grow in height.
- For children who are overweight and those overweight with complications, gradual weight loss is recommended.
- Rate of weight loss should be based on health risks and recommended with caution. Primary goals of treatment are:
 - o Promote healthful lifestyle behaviors to achieve and maintain a desirable body weight
 - o Well-balanced diet that supports growth and development
 - o Behavior modification
 - o Increased physical activity

- o Family involvement
- o Improve/resolve complications of obesity if present
- In children, generally weight loss should not exceed 2 lbs per week and this high rate of weight loss is generally reserved for the 6-11 yr olds in the 99th %-tile or 12-18 yr olds with $\geq 95\%$ -tile

6. List four recommendations that might serve as goals for the nutritional treatment of Jamey's obesity?

- Involve the entire family and/or all caregivers.
- Encourage family activities that provide everyone with exercise.
- Low-fat, low-cholesterol, reduced-sugar diet per age, weight, or BMI and nutritional requirements.
- Make healthy eating fun by using bright colors and unique kid-friendly concepts
 - o ex.: ants on a log, incorporate child in meal prep, etc.
- Encourage planned meals, especially breakfast. Discourage skipping meals.
- Discourage eating while watching television.
- Avoid use of food as a reward or punishment.
- Stock refrigerator with healthy food and drink choices.
- Family should eat meals together as often as possible.
- Learn to read food labels for healthier food selections.
- Select appropriate portion sizes at home and when eating out.
- Reduce number of meals eaten outside the home.
- Encourage 30-60 minutes of moderate physical activity most days of the week.
- Promote a variety of exercises to prevent boredom or overtraining.
 - o after school activities, active video games

III. Nutrition Assessment

7. Assess Jamey's weight using the CDC growth charts provided (p. 8): What is Jamey's BMI percentile? How is her weight status classified? Use the growth chart to determine Jamey's optimal weight for her height and age.

- BMI: 24.9, percentile: >95th.
- Jamey would be classified as obese. The CDC and others regard this child to be in the highest weight classification for age.
- The approximate optimal weight for Jamey's age is 70-72 lbs and her approximate optimal height for age is 55 in.

8. Identify two methods for determining Jamey's energy requirements other than indirect calorimetry, and then use them to calculate Jamey's energy requirements. What calorie goals would you use to facilitate weight loss?

- Total Energy Expenditure, or TEE¹ (for weight maintenance in overweight ages 3-18 years):
 - o $TEE = 389 - (41.2 \times \text{age}[y]) + PA \times (15 \times \text{weight} [\text{kg}] + 701.6 \times \text{height} [\text{m}])$

Where PA is the physical activity factor:

PA = 1.00 if physical activity level (PAL) sedentary

PA = 1.18 if PAL low active

PA = 1.35 if PAL active

PA = 1.6 if PAL very active

- o $TEE = 389 - 41.2(10) + 1[15(52.3 \text{ kg}) + 701.6(1.45 \text{ m})]$
- o $TEE = 389 - 412 + 785 + 1017$
- o TEE = 1779 or round to 1800 kcal/day for ease

¹ National Academy of Sciences Food and Nutrition Board. *Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein, and Amino Acids*. Washington, D.C.: The National Academies Press, 2005.

- kcal/cm
 - o 12-15 kcal/cm for very low energy needs (sedentary)
 - o $12 \times 145 = 1740$ kcal
 - o $15 \times 145 = 2175$ kcal
- For weight loss deduct 108 kcal/day (= 1 lb wt)

9. ***Dietary factors associated with increased risk of overweight are increased dietary fat intake and increased calorie-dense beverages. Identify foods from Jamey's diet recall that fit these criteria.***

- Whole milk
- Apple juice
- Coffee with cream and sugar
- Mayonnaise
- Fritos® corn chips
- Bologna & cheese sandwich
- Twinkies®
- Peanut butter
- Fried chicken
- Fried okra
- Mashed potatoes with whole milk and butter
- Sweet tea
- Coca-Cola®

10. ***Calculate the percent of kcal from each macronutrient and the percent of kcal provided by fluids for Jamey's 24-hour recall.***

- Total kcal: ~ 4419; 44% fat, 42% CHO, and 14% protein
- Fluid kcal: ~ 957; 22% of kcal

11. ***Increased fruit and vegetable intake is associated with decreased risk of overweight. What foods in Jamey's diet fall into these categories?***

Apple juice, fried okra, and potatoes are the only fruit and vegetables she consumed.

12. ***Use the ChooseMyPlate online tool (available from www.choosemyplate.gov; click on "Daily Food Plans" under "SuperTracker and Other Tools") to generate a customized daily food plan. Using this eating pattern, plan a 1-day menu for Jamey.***

Example (answers will vary):

- o AM: 1 c frosted shredded wheat with 4-8 oz skim milk, 1 c orange juice, and whole-wheat bagel (can use a tbsp of cream cheese or butter if desired). Drink at least 8 oz of water.
- o Lunch: PB&J sandwich (use whole-wheat bread), 15 wheat thins (or 21 small pretzels), 8 oz skim milk.
- o After-school snack: Turkey sub (2 or 3 slices of deli turkey, spinach, and 1 tbsp low-fat Ranch on hoagie or preferably whole-wheat bread), 8 oz skim milk. Drink at least 8 oz water.
- o Dinner: Beef burrito (2 oz ground beef, 1 oz refried beans, 1 oz salsa, 1 oz cheddar cheese), dress with tomato, lettuce, onion, corn. 20 oz water (or 12 oz juice).
- o Snack: Banana, orange, or any other fresh fruit you like.

13. ***Now enter and assess the 1-day menu you planned for Jamey using the MyPlate SuperTracker online tool (<http://www.choosemyplate.gov/supertracker-tools/supertracker.html>). Does your menu meet macro- and micronutrient recommendations for Jamey?***

Answers will vary according to the answer to #12.

14. ***Why did Dr. Lambert order a lipid profile and blood glucose tests? What lipid and glucose levels are considered altered (i.e., outside of normal limits) for the pediatric population? Evaluate Jamey's lab results.***

- The combination of being overweight, nightly urination, HTN, and increased appetite along with a family history of gestational diabetes are clues that there may be an increased risk for diabetes.
 - Weight status, HTN, and family history are all risk factors for CVD, so performing a lipid panel helps to screen for additional risk factors that can be controlled early on.
 - Altered lab results: *

Total Cholesterol	> 170 mg/dL
LDL Cholesterol	> 110 mg/dL
HDL Cholesterol	≤ 35 mg/dL
Triglycerides	≥ 150 mg/dL
Glucose	60-100 mg/dL
 - Cholesterol and triglycerides are WNL.
 - LDL and HDL levels are close to being outside of the acceptable range.
 - The glucose level is just outside normal range, but she just ate breakfast two hours before she came in. To be sure, a fasting glucose would be prudent.
- *Using this text laboratory values as reference. Substantial variation exists in the ranges quoted as “normal” and these may vary depending on the assay used by different laboratories.

IV. Nutrition Diagnosis

15. *Select two nutrition problems and complete PES statements for each.*

Following are possible PES statements. It may be helpful for students to initially write more than two nutrition diagnoses and then prioritize as to the ones most likely to have immediate nutrition interventions.

Clinical:

- Overweight related to physical inactivity and excessive energy intake as evidenced by BMI of 24.9 (>95%)

Intake:

- Excessive energy intake related to snacks and meals consisting of calorically dense foods and beverages such as whole milk, regular sweetened sodas, and fried foods as evidenced by typical daily caloric intake of approximately 4400 kcal compared to recommended daily intake of 1800-2000 kcal (Students could also write a similar PES using "Excessive oral food/beverage intake" as the problem.)

Behavioral/Environmental:

- Physical inactivity related to overweight, fatigue, and limited PA at school as evidenced by usual activities limited to playing video games and reading
- Undesirable food choices related to knowledge deficit and low intake of fruits and vegetables as evidenced by frequent intake of juices, whole milk, sweetened beverages, refined carbohydrates, fried foods, and high-fat meals
- Food- and nutrition-related knowledge deficit as evidenced by Jamey’s mother inquiring about the use of food rewards to motivate an increase in physical activity and exercise (in this case an etiology may not be necessary)

V. Nutrition Intervention

16. *What behaviors associated with increased risk of overweight would you look for when assessing Jamey’s and her family’s diets? What aspects of Jamey’s lifestyle place her at increased risk for overweight?*

Behaviors to look for:

- Sedentary lifestyle
- Snacks
- Family’s dinner-time ritual: TV trays or together at the dinner table?
- Parents’ knowledge about benefits of fruits, vegetables, whole grains, and physical activity should be assessed.
- Parents restriction of highly desired food (may lead to overeating when food is available)

- Meals away from home/fast-food/restaurant frequency
- It may help to explain that she feels tired because of the sleep apnea. Once that is treated and she begins a regular schedule of physical activity she may want to be more active.

Being sedentary is the biggest. She also seems to habitually snack while doing nothing.

17. You talk with Jamey and her parents, who are friendly and cooperative. Jamey's mother asks if it would help for them to not let Jamey snack between meals and to reward her with dessert when she exercises. What would you tell the family regarding snacks between meals and rewards with dessert after exercise?

- Snacks between meals are acceptable as long as they are healthy snacks.
 - Fruits and vegetables would be ideal.
 - Foods with mix of protein, carbs, fat, and fiber may help prolong satiety
 - Portion control for snacking
- Instead of using dessert as a reward, Jamey's mother should offer to do some kind of activity like going to the park or shopping with her—anything that will encourage physical activity.

18. Identify one specific physical activity recommendation for Jamey.

- If it's nice out, Jamey and her mother could go out for a walk in the evenings.
- In inclement weather, Jamey and her mother could play the latest motion video game.
- Find organized physical activity/sport for Jamey (social/accountability aspect may enhance interest)

19. For each PES statement written, establish an ideal goal (based on signs and symptoms) and an appropriate intervention (based on etiology).

Clinical:

- Overweight related to physical inactivity and excessive energy intake as evidenced by BMI of 24.9

Ideal Goal: BMI within normal range and less than 85th percentile

Intervention: Nutrition counseling with focus on behavioral modification (refer to specific interventions associated with the intake and behavioral problems defined below).

Intake:

- Excessive energy intake (or oral food/beverage intake) related to snacks and meals consisting of calorically dense foods and beverages such as whole milk, regular sweetened sodas, and fried foods as evidenced by typical daily caloric intake of approximately 4400 kcal compared to recommended daily intake of 1800-2000 kcal

Ideal Goal: Average daily kcal intake within recommended range of 1800-2000 kcal

Intervention: Nutrition education to develop alternative foods and beverages that are nutrient dense.

Modify distribution, type, and amount of foods within meals and snacks to include:

- Reduced-fat milk
- Water for thirst instead of sweetened colas
- Decreased portion sizes
- Increase of fruits, vegetables, and whole grains

Behavioral/Environmental:

- Physical inactivity related to overweight, fatigue and limited PA at school as evidenced by usual activities limited to playing video games and reading

Ideal Goal: Increase in physical activity (can specify an amount or type if desired)

Interventions: In this case, interventions may not necessarily be directed at the etiologies as defined but be designed to lessen signs and symptoms; therefore, nutrition counseling would use the strategies of goal setting, rewards and reinforcement (not foods), and social support to promote physical activities that are

realistic and appropriate for both Jamey and her parents. Students should include in their answer the need for exploring a variety of options that are fun and non-competitive.

- Undesirable food choices related to knowledge deficit and low intake of fruits and vegetables as evidenced by frequent intake of juices, whole milk, sweetened beverages, refined carbohydrates, fried foods, and high-fat meals.

Ideal Goal: Even though this PES statement is quite similar to the intake example noted above, the goals would be defined slightly differently. Instead of a specific caloric goal, goals for this PES would be based on the amount and type of foods described in the signs and symptoms, such as “no more than 4 oz of fruit juice daily” or “limit fried foods to one time weekly,” etc.

Intervention: A similar intervention as noted in the intake section above is appropriate as well.

- Food- and nutrition-related knowledge deficit as evidenced by Jamey's mother inquiring about the use of food rewards to motivate an increase in physical activity and exercise

Ideal Goal: Jamey's mother providing appropriate non-food rewards to motivate an increase in physical activity

Intervention: Nutrition education stating the purpose and use of family counseling theory and strategies that include problem solving, social support, and goal setting.

20. Mr. and Mrs. Whitmer ask about gastric bypass surgery for Jamey. Based on the Evidence Analysis Library from the Academy of Nutrition and Dietetics, what are the recommendations regarding gastric bypass surgery for the pediatric population?

The Expert Committee Recommendations Regarding the Prevention, Assessment, and Treatment of Child and Adolescent Overweight and Obesity² include the following criteria for adolescents being considered for weight-loss surgery:

- Failure of at least six months of organized weight-loss attempts as determined by their primary care provider
- Severely obese (BMI 40 or greater) with serious obesity-related medical complications or have a BMI of 50 or more with less-severe co-morbidities
- Co-morbidities related to obesity that might be resolved with durable weight loss
- Attainment of a majority of skeletal maturity (generally at least 13 years of age for girls and at least 15 years of age for boys).
- Demonstrate commitment to comprehensive medical and psychological evaluations both before and after weight-loss surgery
- Capable and willing to adhere to nutritional guidelines post-operatively
- Able to decide and participate in the decision to undergo weight-loss surgery.
- Have a supportive family environment
- Evaluated by a multi-disciplinary team involved in patient selection, preparation, and surgery as well as immediate and long-term post-operative follow-up care

Potential candidates should be referred to centers with multi-disciplinary weight-management teams that have expertise in meeting the unique needs of obese adolescents. Surgery should be performed in institutions equipped to meet the tertiary needs of severely obese patients that collect long-term data on the clinical outcomes of these patients.

VI. Nutrition Monitoring and Evaluation

² Sarah E. Barlow and the Expert Committee. Expert Committee Recommendations Regarding the Prevention, Assessment, and Treatment of Child and Adolescent Overweight and Obesity: Summary Report. *Pediatrics*, 2007;120;S164-S192. (P. S185).

21. What is the optimal length of weight management therapy for Jamey?

- Nutrition counseling should include goal-setting, self-monitoring, stimulus control, problem-solving, contingency management, cognitive restricting, use of incentives and rewards, and social supports
- MNT should last at least 3 months or until initial weight-management goals are achieved
- Weight control is often a life-long condition and it is critical that a weight management plan be implemented after the intensive phase of treatment
- More contact between the patient and RD may lead to more successful weight loss and maintenance

22. Should her parents be included? Why or why not?

- Family counseling is very important and improves weight management outcomes.
 - Degree of counseling format depends on the family dynamics and should be determined by the professional's discretion (ex.: group vs. individual, caregiver and child vs. parent, etc.)
- Parents need to be ready to make lifestyle changes to support the child/adolescent with cognitive behavior strategies.
 - Parental modeling has advantages in children under 12 years of age
- Components include:
 - o nutrition education on lifestyle behaviors and their relationship to chronic disease development
 - o modification of the home/school environment to enable the adolescent to make wise food choices
 - o self-monitoring and motivation to change by modeling behaviors and contracting

23. What would you assess during a follow-up counseling session? When should this occur?

- Accurate measurement of height and weight, plotted on CDC Growth Chart
 - 24-hour recall with either FFQ or food record
 - Identify areas that have been changed and can be changed
 - Patient's and parents' motivation to change
 - Physical activity record/recall
 - o type of physical activity adolescent participates in
 - o type of physical activity parents participate in
 - o time spent watching TV, video games, or on computer
 - Real or perceived limitations
 - Body image
 - Ethnic or religious practices and beliefs related to food
 - Use of vitamins, supplements, and alcohol or drugs by patient
 - Lab values (lipid profile/glycemic control) if available
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- Weekly visits/follow-ups lasting 8-12 weeks lead to the most effective outcomes. (Once every 2-3 weeks may be more realistic)

Questions for *Medical Nutrition Therapy: A Case Study Approach* 5th ed. Case 1 – Pediatric Weight Management

Instructions: Answer the questions below. You may print your answers or e-mail them to your instructor.

1. Current research indicates that the cause of childhood obesity is multifactorial. Briefly outline how genetics, environment, and nutritional intake might contribute to the development of obesity in children.
2. Describe one health consequence for obese children affecting each of the following physiological systems: cardiovascular, orthopedic, pulmonary, gastrointestinal, and endocrine.
3. How does Jamey's current weight status affect her risk of developing adulthood obesity?
4. Jamey has been diagnosed with obstructive sleep apnea. What is obstructive sleep apnea? Explain the relationship between sleep apnea and obesity.
5. In general, what are the goals for weight loss in the pediatric population? Are there concerns to consider when developing recommendations for an overweight child who is still growing?
6. List four recommendations that might serve as goals for the nutritional treatment of Jamey's obesity?
7. Assess Jamey's weight using the CDC growth charts provided (p. 8): What is Jamey's BMI percentile? How is her weight status classified? Use the growth chart to determine Jamey's optimal weight for her height and age.
8. Identify two methods for determining Jamey's energy requirements other than indirect calorimetry, and then use them to calculate Jamey's energy requirements. What calorie goals would you use to facilitate weight loss?
9. Dietary factors associated with increased risk of overweight are increased dietary fat intake and increased calorie-dense beverages. Identify foods from Jamey's diet recall that fit these criteria.
10. Calculate the percent of kcal from each macronutrient and the percent of kcal provided by fluids for Jamey's 24-hour recall.
11. Increased fruit and vegetable intake is associated with decreased risk of overweight. What foods in Jamey's diet fall into these categories?
12. Use the ChooseMyPlate online tool (available from www.choosemyplate.gov; click on "Daily Food Plans" under "SuperTracker and Other Tools") to generate a customized daily food plan. Using this eating pattern, plan a 1-day menu for Jamey.
13. Now enter and assess the 1-day menu you planned for Jamey using the MyPlate SuperTracker online tool (<http://www.choosemyplate.gov/supertracker-tools/supertracker.html>). Does your menu meet macro- and micronutrient recommendations for Jamey?
14. Why did Dr. Lambert order a lipid profile and blood glucose tests? What lipid and glucose levels are considered altered (i.e., outside of normal limits) for the pediatric population? Evaluate Jamey's lab results.
15. Select two nutrition problems and complete PES statements for each.
16. What behaviors associated with increased risk of overweight would you look for when assessing Jamey's and her family's diets? What aspects of Jamey's lifestyle place her at increased risk for overweight?

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18. Identify one specific physical activity recommendation for Jamey.
19. For each PES statement written, establish an ideal goal (based on signs and symptoms) and an appropriate intervention (based on etiology).
20. Mr. and Mrs. Whitmer ask about gastric bypass surgery for Jamey. Based on the Evidence Analysis Library from the Academy of Nutrition and Dietetics, what are the recommendations regarding gastric bypass surgery for the pediatric population?
21. What is the optimal length of weight management therapy for Jamey?
22. Should her parents be included? Why or why not?
23. What would you assess during a follow-up counseling session? When should this occur?