FIFTH EDITION

Medical Nutrition Therapy

A Case Study Approach

Marcia Nahikian Nelms

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Ohio State University

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***Medical Nutrition Therapy: A Case Study Approach*, Fifth Edition**
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DEDICATION

Dedicated to Sara Long Roth, PhD, RDN, LD who was my original co-author for this text and is now happily enjoying retirement!

To my students—past and present—who continue to challenge me, teach me, and guide me as I strive to enhance dietetic education.

CONTENTS

PREFACE

In teaching, I seek to promote the fundamental values of humanism, democracy, and the sciences—that is, a curiosity about new ideas and enthusiasm for learning, a tolerance for the unfamiliar, and the ability to critically evaluate new ideas.

I wish to provide the environment that will support students in their quest for integration of knowledge and support the development of critical thinking skills. Thus, I strive to develop these "laboratories" and "real-world" situations that mimic the professional community to build that bridge to clinical practice.

The idea for this book actually began more than fifteen years ago as I began teaching medical nutrition therapy to dietetic students, and now, as this fifth edition publishes, I hope that these cases reflect the most recent nutrition therapy practice. Entering the classroom after being a clinician for many years, I knew I wanted my students to experience nutritional care as realistically as possible. I wanted the classroom to actually be the bridge between the textbook and the clinical setting. In fashioning one of the tools used to build that bridge, I relied heavily on my clinical experience to develop what I hoped would be realistic clinical applications. Use of a clinical application or case study is not a new concept; the use of case studies in nutrition, medicine, nursing, and many other allied health fields is commonplace. The case study places the student in a situation that forces integration of knowledge from many sources; supports use of previously learned information; puts the student in a decision-making role; and nurtures critical thinking.

What makes this text different, then, from a simple collection of case studies? The pedagogy we have developed over the years with each case takes the student one step closer as he or she moves from the classroom to the real world. The cases represent the most common diagnoses that rely on nutrition therapy as an essential component of the medical care. Therefore, I believe these cases represent the type of patient with which the student will most likely be involved. The concepts presented in these cases can apply to many other medical conditions that may not be presented here. Furthermore, the instructor can choose a variety of questions from each case, even if he or she chooses not to have the student complete the entire case. The cases represent both introductory and advanced-level practice and, therefore, use of this text allows faculty to choose among many cases and questions that fit students' varying skill levels.

The cases cross the life span, allowing the student to see the practice of nutrition therapy during childhood, adolescence, and adulthood through the elder years. I have tried to represent the diversity of individual patients the Registered Dietitian encounters today. Placing nutrition therapy and nutrition education within the appropriate cultural context is crucial.

The electronic medical record provides the structure for each case. The student will seek information to solve the case by using the exact tools he or she will need to use in the clinical setting. As the student moves from the admission or outpatient visit record to the physician's history and physical, to laboratory data, and to documentation of daily care, the student will need to discern the relevant information from the medical record.

Questions for each case are organized using the nutrition care process, beginning with items introducing the pathophysiology and principles of nutrition therapy for the case and then proceeding through each component of the process. Questions prompt the student to identify nutrition problems and then synthesize a PES statement. It will be helpful to begin by orienting the student to the components of a case. I have provided an outline of this introduction below (see "Introducing Case Studies"). Teaching needs to be purposeful. If the instructor takes the responsibility of teaching students how to use this book seriously, it is much more likely that student autonomy will be the end result.

To be consistent with the philosophy of the text, each case requires that the student seek information from multiple resources to complete the case. Many of the articles and online sites provide essential data regarding diagnosis and treatment within that case. I have found that when students learn how to research the case, their expertise grows exponentially.

The cases lend themselves to be used in several different teaching situations. They fit easily into a problem-based learning curriculum, and also can be used as a summary for classroom teaching of the pathophysiology and nutrition therapy for each diagnosis. The cases can be integrated into the appropriate rotation for a dietetic internship, medical school, or nursing school curricula. Furthermore, these cases can be successfully used to develop standardized patient and simulation experiences.

Objectives for student learning within each case are built around the nutrition care process and competencies for dietetic education. This allows an additional path for nutrition and dietetic faculty to document student performance as part of program assessment.

New to the Fifth Edition

Several important factors have prompted the changes to this fifth edition. As we introduced in the fourth edition, the template for the cases is a typical electronic medical record (EMR). Though the EMRs used in clinics, physician's offices, and hospitals vary, these cases capture the primary sources of information that the clinician will access to provide a thorough nutrition assessment for her or his patient. The setting for some of the cases has also been changed to reflect outpatient care within the patient-centered medical home.

Secondly, our reviewers requested that the cases be shortened in length. I have streamlined all of the cases so that questions are more precise. Finally, even within a two- to three-year period, medical and nutritional care can change dramatically. These cases reflect the most recent research and evidenced-based literature so that the student moves toward higher levels of practice.

The fifth edition introduces the following new cases:

Case 8 Gastroparesis
Case 13 Gastrointestinal surgery with ostomy
Case 14 Nonalcoholic Steatohepatitis (NASH)
Case 24 Adult Traumatic Brain Injury (TBI)
Case 25 Pediatric Cerebral Palsy
Case 31 Breast Cancer
Case 32 Tongue Cancer treated with surgery and radiation

For the additional cases you will find in this edition—although the diagnosis may have been included in previous editions—the cases have also been significantly changed to reflect current medical care with appropriate changes in drugs, procedures, and nutrition interventions. For example, the presenting signs and symptoms in the celiac disease case have been changed so they are not the classic gastrointestinal complaints traditionally associated with this disorder. Case 4, on hypertension and cardiovascular disease, incorporates questions and a discussion of the Mediterranean dietary pattern. The heart failure case includes discussion of malnutrition risk. Within the open abdomen surgical case, morbid obesity with sepsis case, and acute pancreatitis case, we have incorporated the most recent literature about assessment of these critically ill patients, and the use of nutrition support has been altered to reflect current practice. Incorporation of evidence-based guidelines is encouraged throughout each of the cases, and the questions are designed to not only follow the nutrition care process but also require the student to evaluate the most current literature.

TEACHING STRATEGIES

You can find cases to emphasize specific topics that are part of the curriculum for pathophysiology and medical nutrition therapy (a list of cases by topic is provided below). I have found that when specific questions are selected for each case, they can be modified to assist in the pedagogy for other classes as well.

Nutrition Assessment: Case 1 Pediatric Weight Management; Case 3 Malnutrition associated with chronic disease; Case 4 Hypertension and Cardiovascular Disease

Fluid Balance/Acid-Base Balance: Case 13 GI surgery with ostomy; Case 27 COPD with Respiratory Failure; Case 29 Metabolic Stress and Trauma: Open Abdomen

Genetics/Immunology/Infectious Process: Case 10 Celiac Disease; Case 12 Inflammatory Bowel Disease; Case 16 Pediatric Type 1 Diabetes Mellitus; Case 17 Type 1 Diabetes Mellitus in the Adult; Case 31 Breast Cancer

Hypermetabolism/Metabolic Stress: Case 15 Acute Pancreatitis; Case 21 Acute Kidney Injury (AKI); Case 24 Adult Traumatic Brain Injury: Metabolic Stress with Nutrition Support; Case 28 Metabolic Stress and Trauma: Open Abdomen; Case 28 Burn Injury; Case 30 Nutrition Support in Sepsis and Morbid Obesity

Dysphagia: Case 22 Ischemic Stroke; Case 23 Progressive Neurological Disease: Parkinson's Disease; Case 25 Pediatric Cerebral Palsy; Case 32 Tongue Cancer Treated with Surgery and Radiation

Nutritional Needs of the Elderly: Case 3 Malnutrition associated with chronic disease; Case 6 Heart Failure; Case 22 Ischemic Stroke; Case 27 COPD with Respiratory Failure

Malnutrition: Case 3 Malnutrition associated with chronic disease; Case 6 Heart Failure; Case 26 COPD; Case 28 Metabolic Stress and Trauma: Open Abdomen; Case 29 Nutrition Support for Burn Injury; Case 30 Nutrition Support in Sepsis and Morbid Obesity; Case 32 Tongue Cancer treated with surgery and radiation

Pediatrics: Case 1 Pediatric Weight Management; Case 14 Pediatric Type 1 Diabetes Mellitus; Case 25 Pediatric Cerebral Palsy

Nutrition Support: Case 12 Inflammatory Bowel Disease: Crohn's Disease; Case 15 Acute Pancreatitis; Case 21 Acute Kidney Injury; Case 23 Progressive Neurological Disease: Parkinson's Disease; Case 24 Adult Traumatic Brain Injury; Case 28 Metabolic Stress and Trauma: Open Abdomen; Case 29 Burn Injury; Case 30 Nutrition Support in Sepsis and Morbid Obesity; Case 32 Tongue Cancer treated with surgery and radiation

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Dena Champion, MS, RD, CSO
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Dawn Scheiderer, RD, LD
Colleen Spees, PhD, RDN, LD, FAND
Sheela Thomas, MS, RD, CNSC

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Dr. Nahikian-Nelms is currently a professor of clinical health and rehabilitation sciences and director of the coordinated dietetic programs in the Division of Medical Dietetics. She is also nutrition faculty for the Division of Gastroenterology, Hepatology, and Nutrition, and for the Leadership Education in Neurodevelopmental Disabilities (LEND) in the College of Medicine at The Ohio State University. She has practiced as a dietitian and public health nutritionist for over thirty years. She is the lead author for the textbooks *Nutrition Therapy and Pathophysiology; Medical Nutrition Therapy: A Case Study Approach*; and a contributing author for *Food and Culture*. Additionally, she has contributed to the Academy of Nutrition and Dietetics *Nutrition Care Manual* sections on gastrointestinal disorders and is the author of numerous peer-reviewed journal articles and chapters for other texts. The focus of her clinical expertise is the development and practice of evidence-based nutrition therapy for a variety of conditions, including diabetes, gastrointestinal disease, and hematology/oncology for both pediatric and adult populations, as well as the development of alternative teaching environments for students receiving their clinical training. Dr. Nahikian-Nelms has received the Outstanding Teaching Award in the School of Health and Rehabilitation Sciences at Ohio State; Governor's Award for Outstanding Teaching for the State of Missouri, Outstanding Dietetic Educator in Missouri and Ohio, and the PRIDE award from Southeast Missouri State University in recognition of her teaching.

INTRODUCING CASE STUDIES, OR FINDING YOUR WAY THROUGH A CASE STUDY

Have you ever put together a jigsaw puzzle or taught a young child how to complete a puzzle?

Almost everyone has at one time or another. Recall the steps that are necessary to build a puzzle. You gather together the straight edges, identify the corner pieces, and match the like colors. There is a method and a procedure to follow that, when used persistently, leads to the completion of the puzzle.

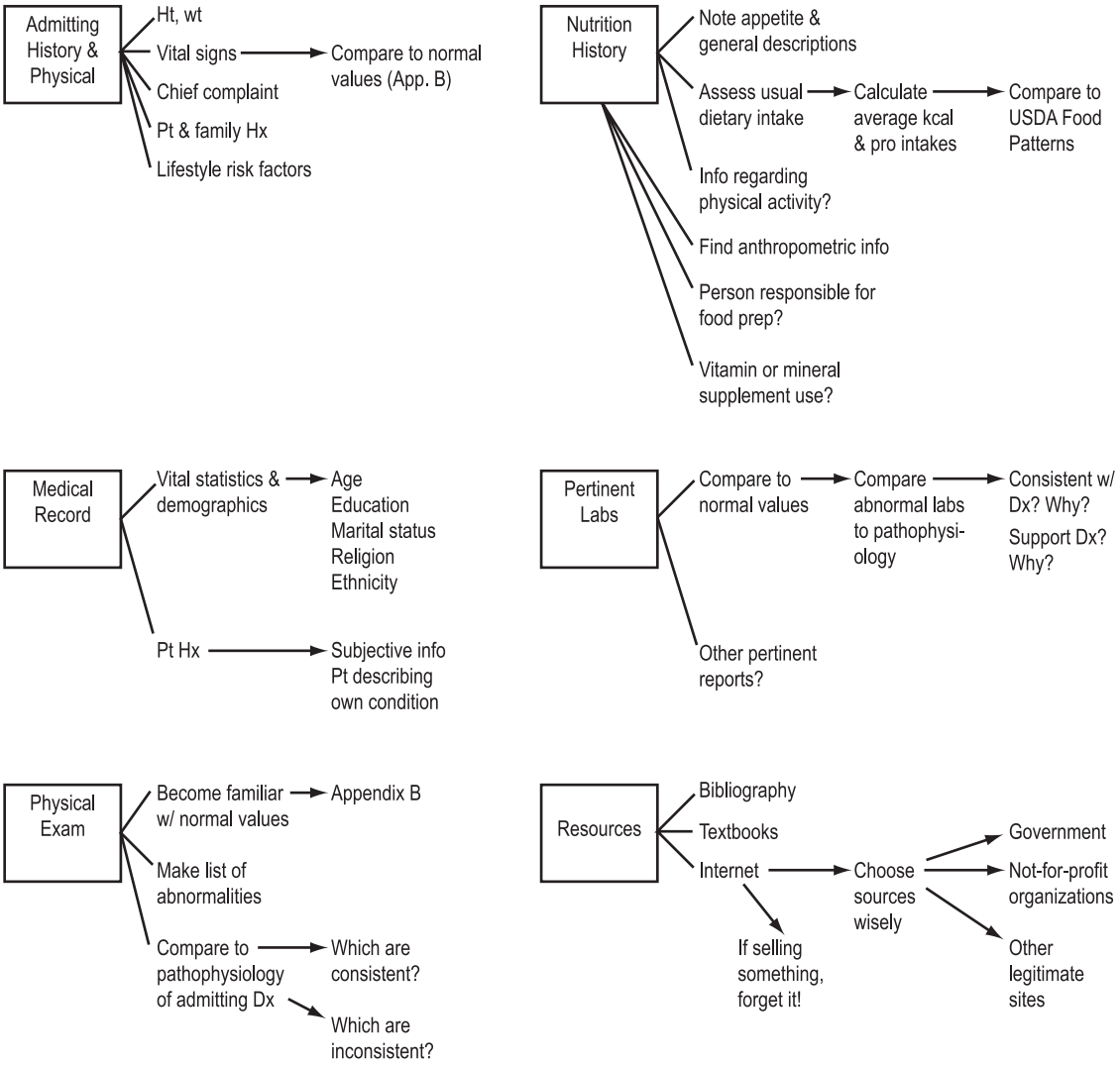
Finding your way through a case study is much like assembling a jigsaw puzzle. Each piece of the case study tells a portion of the story. As a student, your job is to put together the pieces of the puzzle to learn about a particular diagnosis, its pathophysiology, and the subsequent medical and nutritional treatment. Although each case in the text is different, the approach to working with the cases remains the same, and with practice, each case study and each medical record becomes easier to manage. The following steps provide guidance for working with each case study.

1. Identify the major parts of the case study.
   - Admitting history and physical
   - Documentation of MD orders, nursing assessment, and results from other care providers
   - Laboratory data
   - Bibliography
2. Read the case carefully.
   - Get a general sense of why the person has been admitted to the hospital.
   - Use a medical dictionary to become acquainted with unfamiliar terms.
   - Use the list of medical abbreviations provided in Appendix A to define any that are unfamiliar to you.
3. Examine the admitting history and physical for clues.
   - Height, Weight
   - Vital signs (compare to normal values for physical examination in Appendix B)
   - Chief complaint
   - Patient and family history
   - Lifestyle risk factors
4. Review the medical record.
   - Examine the patient's vital statistics and demographic information (e.g., age, education, marital status, religion, ethnicity).
   - Read the patient history (remember, this is the patient's subjective information).
5. Use the information provided in the physical examination.
   - Familiarize yourself with the normal values found in Appendix B.
   - Make a list of those things that are abnormal.
   - Now compare abnormal values to the pathophysiology of the admitting diagnosis. Which are consistent? Which are inconsistent?
6. Evaluate the nutrition history.
   - Note appetite and general descriptions.
   - Evaluate the patient's dietary history: calculate average kcal and protein intakes and compare to population standards and recommendations such as the USDA Food Patterns.
   - Is there any information regarding physical activity?
   - Find anthropometric information.
   - Is the patient responsible for food preparation?
   - Is the patient taking a vitamin or mineral supplement?
7. Review the laboratory values.
   - Hematology
   - Chemistry
   - What other reports are present?
   - Compare the values to the normal values listed. Which are abnormal? Highlight those and then compare to the pathophysiology. Are they consistent with the diagnosis? Do they support the diagnosis? Why?

8. Use your resources.
- Use the bibliography provided for each case.
- Review your nutrition textbooks.
- Use any books on reserve.
- Access information on the Internet but choose your sources wisely: stick to government, not-for-profit organizations, and other legitimate sites. A list of reliable Internet resources is provided for each case.

Mindmap

A mindmap is a graphic representation of the elements of the case study and the steps in its analysis. This organization can assist in connecting bodies of information and allow for further development of critical thinking skills.



Unit One

ENERGY BALANCE AND BODY WEIGHT

Unit One introduces nutrition therapy for treatment of disorders of weight balance and draws our attention to these major public health concerns in the United States. The first case uses pediatric obesity as a springboard for a discussion of the implications of the rapidly rising rate of childhood obesity. The incidence of childhood obesity has more than tripled over the past three decades with an estimated 12.5 million children and adolescents in the United States meeting the criteria for overweight and obesity. The child featured in Case 1 is representative of children ages 6–11. Pediatric obesity treatment requires complex interventions to address family, environmental, and economic concerns. This case allows the student to explore the current research and the use of evidence-based guidelines to determine appropriate nutrition therapy.

Case 2 uses the record of a bariatric surgery patient as an opportunity to learn about morbid obesity. More than 3 million individuals in the United States are considered to be morbidly obese—this is also referred to as Class III obesity or a body mass index (BMI) $>$40.0. Health consequences of untreated morbid obesity include type 2 diabetes mellitus, coronary heart disease and hypertension, cancer, sleep apnea, and even premature death. According to the 2013 American Heart Association and American College of Cardiology guideline for management of overweight and obesity in adults, those individuals who have failed to lose weight by less invasive means, and who meet the medical criteria, may consider bariatric surgery as a treatment method for weight control. This case allows the student to research the surgical options used for bariatric surgery and to begin to understand the progression of nutrition therapy used postoperatively.

Case 3 explores the diagnosis of malnutrition. As early as 1979, Charles Butterworth attempted to raise awareness of the increasing incidence of malnutrition in the U.S. health care system with his classic article, "The Skeleton in the Hospital Closet." Unfortunately, the rate of malnutrition is still considered to be significant today—and is associated with increased hospital costs, increased morbidity and mortality, and decreased quality of life for these individuals. Recently, new definitions of malnutrition have been proposed by the Academy of Nutrition and Dietetics (AND) and the Association for Parenteral and Enteral Nutrition (ASPEN) in an effort to more consistently identify those individuals who are at risk for malnutrition and who are malnourished, so that expedient interventions may occur. This case uses the most recent literature to provide the opportunity to recognize and apply the newly proposed diagnostic criteria for malnutrition.

Case 1

Pediatric Weight Management

Objectives

After completing this case, the student will be able to:

1. Describe the physiological effects of overweight/obesity in the pediatric population.
2. Interpret laboratory parameters for nutritional implications and significance.
3. Analyze nutrition assessment data to evaluate nutritional status and identify specific nutrition problems.
4. Determine nutrition diagnoses and write appropriate PES statements.
5. Prescribe appropriate nutrition therapy.
6. Develop a nutrition care plan with appropriate measurable goals, interventions, and strategies for monitoring and evaluation consistent with the nutrition diagnoses of this case.

Jamey Whitmer is taken to see her pediatrician by her parents, who have noticed she appears to stop breathing while sleeping. She is diagnosed with sleep apnea related to her weight and referred to the registered dietitian for nutrition counseling.

Whitmer, Jamey, Female, 10 y.o.
Allergies: No known allergies | **Code:** FULL | **Isolation:** None
Pt. Location: University Clinic | **Physician:** Lambert, S. David | **Appointment Date:** 9/22

Patient Summary: 10-year-old female is here with parents who describe concerns that their daughter appears to stop breathing while she is sleeping.

History:
Onset of disease: Parents describe sleep disturbance in their daughter for the past several years, including: sleeping with her mouth open, cessation of breathing for at least 10 seconds (per episode), snoring, restlessness during sleep, enuresis, and morning headaches. They also mention that Jamey's teacher reports difficulty concentrating in school and a change in her classroom performance. She is the second child born to these parents—full-term infant with birthweight of 10 lbs 5 oz; 23" length. Actual date of onset for current medical problems is unclear, but parents first noticed onset of the above-mentioned symptoms about one year ago.
Medical history: None
Surgical history: None
Family history: What? Possible gestational diabetes; type 2 DM; Who? Mother and grandmother

Demographics:
Years education: Third grade
Language: English only
Occupation: Student
Household members: Father age 36, mother age 35, sister age 5
Ethnicity: Caucasian
Religious affiliation: Presbyterian

MD Progress Note:
Review of Systems
Constitutional: Negative
Skin: Negative
Cardiovascular: Negative
Respiratory: Negative
Gastrointestinal: Negative
Neurological: Negative
Psychiatric: Negative

Physical Exam
Constitutional: Somewhat tired and irritable 10-year-old female
Cardiovascular: Regular rate and rhythm, heart sounds normal
HEENT: Eyes: Clear
Ears: Clear
Nose: Normal mucous membranes
Throat: Dry mucous membranes, no inflammation, tonsillar hypertrophy
Genitalia: SMR (Tanner) pubic hair stage 3, genital stage 3

Whitmer, Jamey, Female, 10 y.o.
Allergies: No known allergies **Code:** FULL **Isolation:** None
Pt. Location: University Clinic **Physician:** Lambert, S. David **Appointment Date:** 9/22

Neurologic: Alert, oriented ☒ 3
Extremities: No joint deformity or muscle tenderness, but patient complains of occasional knee pain. No edema, strength 5/5.
Skin: Warm, dry; reduced capillary refill (approximately 2 seconds); slight rash in skin folds
Chest/lungs: Clear
Abdomen: Obese

Vital Signs: Temp: 98.5 Pulse: 85 Resp rate: 27
BP: 123/80 Height: 57" Weight: 115 lbs BMI: 24.9

Assessment and Plan:
10-year-old female here with parents c/o of breathing difficulty at night. Child has steadily gained weight over previous several years— >10 lbs per year.

Dx: R/O obstructive sleep apnea (OSA) secondary to obesity and physical inactivity

Medical Tx plan: Polysomnography to diagnose OSA, FBG, HbA_{1C}, lipid panel (total cholesterol, HDL-C, LDL-C, triglycerides), psychological evaluation, nutrition assessment

..... SD Lambert, MD

Nutrition:
General: Very good appetite with consumption of a wide variety of foods. Jamey's physical activity level appears to be minimal. Her elementary school discontinued physical education, art, and music classes due to budget cuts five years ago. She likes playing video games and reading. Mother is 5'2" and weighs 225# lbs. Father is 5'10" and weighs 185 lbs. Sister has a weight/height at 85%tile with BMI at 75%tile.

24-hour recall:

AM:	2 breakfast burritos, 8 oz whole milk, 4 oz apple juice, 6 oz coffee with ¼ c cream and 2 tsp sugar
Lunch:	2 bologna and cheese sandwiches with 1 tbsp mayonnaise each, 1-oz pkg Fritos corn chips, 2 Twinkies, 8 oz whole milk
After-school snack:	Peanut butter and jelly sandwich (2 slices enriched bread with 2 tbsp crunchy peanut butter and 2 tbsp grape jelly), 12 oz whole milk
Dinner:	Fried chicken (2 legs and 1 thigh), 1 c mashed potatoes (made with whole milk and butter), 1 c fried okra, 20 oz sweet tea
Snack:	3 c microwave popcorn, 12 oz Coca-Cola

Food allergies/intolerances/aversions: NKA
Previous nutrition therapy? No
Food purchase/preparation: Parent(s)
Vitamin intake: Flintstones vitamin daily

Whitmer, Jamey, Female, 10 y.o.
Allergies: No known allergies **Code:** FULL **Isolation:** None
Pt. Location: University Clinic **Physician:** Lambert, S. David **Appointment Date:** 9/22

Laboratory Results (Pediatric)

	Ref. Range	9/22
Chemistry		
Sodium, 10–14 yo (mEq/L)	136–145	142
Potassium, 10–14 yo (mEq/L)	3.5–5.0	4.3
Chloride, 10–14 yo (mEq/L)	98–108	101
Carbon dioxide, 10–14 yo (CO_2, mEq/L)	22–30	25
Bicarbonate, 10–14 yo (mEq/L)	22–26	25
BUN, 10–14 yo (mg/dL)	5–18	8
Creatinine serum, 10–14 yo (mg/dL)	≤1.2	0.6
Uric acid, 10–14 yo (mg/dL)	2.5–5.5	3.1
Glucose, 10–14 yo (mg/dL)	70–99	112 !↑
Phosphate, inorganic, 10–14 yo (mg/dL)	2.2–4.6	3.1
Magnesium, 10–14 yo (mg/dL)	1.6–2.6	1.7
Calcium, 10–14 yo (mg/dL)	8.6–10.5	9.1
Osmolality, 10–14 yo (mmol/kg/H_2O)	275–295	302 !↑
Bilirubin total, 10–14 yo (mg/dL)	≤1.2	0.9
Bilirubin, direct, 10–14 yo (mg/dL)	<0.3	0.2
Protein, total, 10–14 yo (g/dL)	6–7.8	6.5
Albumin, 10–14 yo (g/dL)	3.5–5	4.8
Prealbumin, 10–14 yo (mg/dL)	17–39	33
Cholesterol, 10–14 yo (mg/dL)	124–201 F 119–202 M	165
HDL-C, 10–14 yo (mg/dL)	37–74	34 !↓
VLDL, 10–14 yo (mg/dL)	calculated	13
LDL, 10–14 yo (mg/dL)	64–133	118
LDL/HDL ratio, 10–14 yo	<3	9.07
Triglycerides, 10–14 yo (mg/dL)	10–121 F 10–103 M	65
T_4, 10–14 yo (µg/dL)	5.6–11.7	6.1
T_3, 10–14 yo (µg/dL)	83–213	79 !↓
HbA_{1C}, 10–14 yo (%)	3.9–5.2	4.5
Hematology		
WBC, 10–14 yo (× $10^3/mm^3$)	4.0–13.5	4.1
Hemoglobin, 10–14 yo (Hgb, g/dL)	11–16	13.1
Hematocrit, 10–14 yo (Hct, %)	31–43	38

Case Questions

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. Include at least three specific factors in each of the previously mentioned categories.

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.

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?

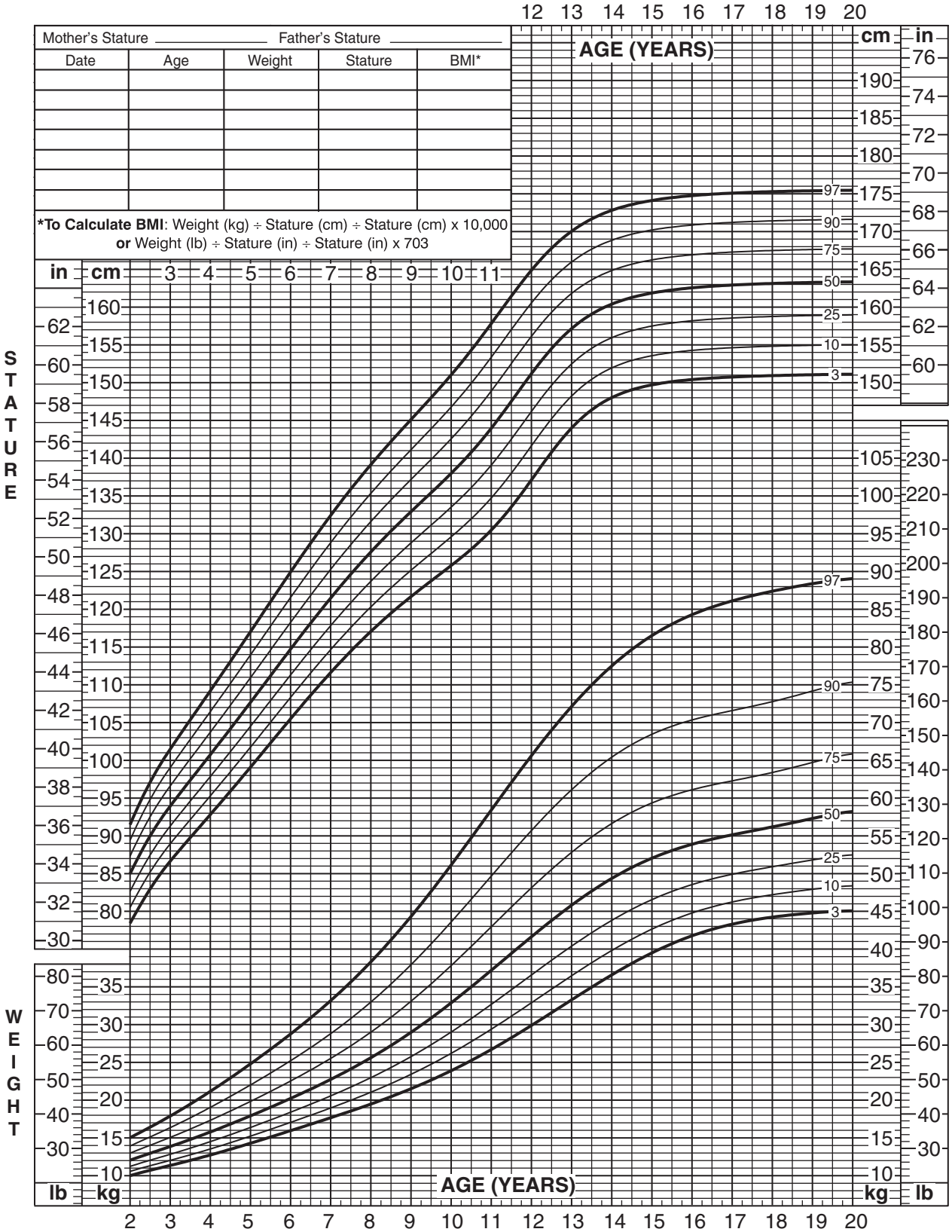
6. List four recommendations that might serve as goals for the nutritional treatment of Jamey's obesity.

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.

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 goal would you use to facilitate weight loss?

Stature-for-Age and Weight-for-Age Percentiles: Girls, 2 to 20 Years



Source: Centers for Disease Control and Prevention. National Center for Health Statistics. 2000 CDC Growth Charts: United States. Available at http://www.cdc.gov/growthcharts. Accessed April 10, 2008.

9. Dietary factors associated with increased risk of overweight include 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.

IV. Nutrition Diagnosis

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

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?

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?

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 or other evidenced-based guideline, what are the recommendations regarding gastric bypass surgery for the pediatric population?

VI. Nutrition Monitoring and Evaluation

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?

Bibliography

Academy of Nutrition and Dietetics Evidence Based Library. Balanced Macronutrient Diet and Treating Childhood Obesity in Children Ages 6–12. AND Evidence Analysis Library. http://www.andeal.org/topic.cfm?cat=2914&conclusion_statement_id=250444. Accessed 02/10/15.

Academy of Nutrition and Dietetics Evidence Based Library. Effectiveness of using balanced macronutrient, reduced calorie (900–1200 kcal per day) dietary interventions for treating childhood obesity in children ages 6–12. AND Evidence Analysis Library. http://www.andeal.org/topic.cfm?cat=2914&conclusion_statement_id=250444. Accessed 02/10/15.

Academy of Nutrition and Dietetics Evidence Based Library. Effectiveness of using a program to increase physical activity as a part of an intervention program to treat childhood obesity. AND Evidence Analysis Library. http://www.andeal.org/topic.cfm?cat=2940&conclusion_statement_id=105. Accessed 02/10/15.

Academy of Nutrition and Dietetics. Pediatric Nutrition Care Manual, Overweight/Obesity. https://www.nutritioncaremanual.org/topic.cfm?ncm_category_id=13&lv1=144636&lv2=144783&ncm_toc_id=144783&ncm_heading=Nutrition%20Care. Accessed 02/10/15.

Academy of Nutrition and Dietetics Evidence Based Library. Pediatric Weight Management (PWM) Comprehensive, Multicomponent Weight Program for Treating Childhood Obesity. AND Evidence Analysis Library. http://www.andeal.org/template.cfm?template=guide_summary&key=1284. Accessed 02/10/15.

Academy of Nutrition and Dietetics Evidence Based Library. Pediatric Weight Management: Major Recommendations. AND Evidence Analysis Library. http://www.andeal.org/topic.cfm?menu=5296&cat=2724. Accessed 02/10/15.

Academy of Nutrition and Dietetics Evidence Based Library. Pediatric Weight Management (PWM) Physical Activity in the Treatment of Childhood and Adolescent Obesity. AND Evidence Analysis Library. http://www.andeal.org/template.cfm?template=guide_summary&key=1224. Accessed 02/10/15.

Academy of Nutrition and Dietetics Evidence Based Library. The Traffic Light Diet and Treating Childhood Obesity. AND Evidence Analysis Library. http://www.andeal.org/topic.cfm?menu=5296&pcat=4162&cat=4184. Accessed 02/10/15.

Blüher S, Petroff D, Wagner A, et al. The one year exercise and lifestyle intervention program KLAKS: Effects on anthropometric parameters, cardiometabolic risk factors and glycemic control in childhood obesity. *Metabolism*. 2014;63:422–30.

Centers for Disease Control and Prevention, National Center for Health Statistics. CDC growth charts: United States. http://www.cdc.gov/growthcharts/. Accessed 02/10/15.

Dihingia A, Das A. Childhood obesity: Issues of the burden, its genesis and prevention. *SJAMS*. 2014;2:1700–1710.

Farajian P, Panagiotakos DB, Risvas G, Malisova O, Zampelas A. Hierarchical analysis of dietary, lifestyle and family environment risk factors for childhood obesity: The GRECO study. *Eur J Clin Nutr*. 2014;68:1107–12.

Let's Move! http://www.letsmove.gov/. Accessed 02/10/15.

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

Lacey K. Diseases and disorders of energy balance. In: Nelms M, Sucher K, Lacey K. *Nutrition Therapy and Pathophysiology.* 3rd ed. Belmont, CA: Wadsworth, Cengage Learning; 2016:250–291.

Noqueira I, Hrovat K. Adolescent bariatric surgery: Review on nutrition considerations. *Nutr Clin Pract*. 2014;29:740–746.

United States Department of Agriculture. Information for Health Care Professionals. MyPlate. http://www.choosemyplate.gov/information-healthcare-professionals.html. Accessed 02/10/15.

Internet Resources

American Academy of Pediatrics—Institute for Healthy Childhood Weight: https://ihcw.aap.org/Pages/default.aspx

American Sleep Apnea Association: http://www.sleepapnea.org/

Baylor College of Medicine Children's Nutrition Research Center: https://www.bcm.edu/departments/pediatrics/sections-divisions-centers/childrens-nutrition-research-center/

Centers for Disease Control and Prevention, "Basics about Childhood Obesity": http://www.cdc.gov/obesity/childhood/basics.html

Centers for Disease Control and Prevention. Growth Charts: http://www.cdc.gov/growthcharts/

Case 2

Bariatric Surgery for Morbid Obesity

Objectives

After completing this case, the student will be able to:

1. Identify criteria that allow for an individual to qualify as a candidate for bariatric surgery.
2. Research and outline the health risks associated with morbid obesity.
3. Identify the current surgical procedures used for bariatric surgery.
4. Describe the potential physiological changes and nutrition problems that may occur after bariatric surgery.
5. Interpret nutrition assessment data to assist with the design of measurable goals, interventions, and strategies for monitoring and evaluation that address the nutrition diagnoses for the patient.
6. Understand current nutrition therapy guidelines for progression of oral intake after bariatric surgery.

Mr. McKinley is admitted for a Roux-en-Y gastric bypass surgery. He has suffered from type 2 diabetes mellitus, hyperlipidemia, hypertension, and osteoarthritis. Mr. McKinley has weighed over 250 lbs since age 15 with steady weight gain since that time. He has attempted to lose weight numerous times but the most weight he ever lost was 75 lbs, which he regained over a two-year period. He had recently reached his highest weight of 434 lbs, but since beginning the preoperative nutrition education program he has lost 24 lbs.

McKinley, Chris, Male, 37 y.o.
Allergies: NKA **Code:** FULL **Isolation:** None
Pt. Location: RM 703 **Physician:** P Walker **Admit Date:** 2/23

Patient Summary: Patient is a morbidly obese 37-year-old white male who is admitted for Roux-en-Y gastric bypass surgery scheduled for 2/24. Patient has been obese his entire adult life with highest weight 6 months ago at 434 lbs. He has lost 24 lbs since that time as he has been attending the preoperative nutrition program at our clinic.

History:
Onset of disease: Lifelong obesity
Medical history: Type 2 diabetes mellitus, hypertension, hyperlipidemia, osteoarthritis
Surgical history: R total knee replacement 3 years previous
Medications at home: Metformin 1000 mg/twice daily; 35 u Lantus pm; Lasix 25 mg/day; Lovastatin 60 mg/day
Tobacco use: None
Alcohol use: Socially, 2–3 beers per week
Family history: Father: Type 2 DM, CAD, Htn, COPD; Mother: Type 2 DM, CAD, osteoporosis

Demographics:
Marital status: Single
Number of children: 0
Years education: Associate's degree
Language: English only
Occupation: Office manager for real estate office
Hours of work: 8–5 daily—sometimes on weekend
Household members: Lives with roommate
Ethnicity: Caucasian
Religious affiliation: None stated

Admitting History/Physical:
Chief complaint: "I am here for weight-loss surgery."
General appearance: Obese white male

Vital Signs: Temp: 98.9 Pulse: 85 Resp rate: 23
BP: 135/90 Height: 5'10" Weight: 410 lbs
Heart: Normal rate, regular rhythm, normal heart; diminished distal pulses. Exam reveals no gallop and no friction rub.
HEENT: Head: WNL
Eyes: PERRLA
Ears: Clear
Nose: WNL
Throat: Moist mucous membranes without exudates or lesions
Genitalia: Normally developed 37-year-old male
Neurologic: Alert and oriented
Extremities: Ecchymosis, abrasions, petechiae on lower extremities, 2+ pitting edema

McKinley, Chris, Male, 37 y.o.
Allergies: NKA **Code:** FULL **Isolation:** None
Pt. Location: RM 703 **Physician:** P Walker **Admit Date:** 2/23

Skin: Warm, dry to touch
Chest/lungs: Respirations WNL, clear to auscultation and percussion
Peripheral vascular: Diminished pulses bilaterally
Abdomen: Obese, rash present under skinfolds

Nursing Assessment	**2/23**
Abdominal appearance (concave, flat, rounded, obese, distended)	obese
Palpation of abdomen (soft, rigid, firm, masses, tense)	soft
Bowel function (continent, incontinent, flatulence, no stool)	continent
Bowel sounds (P=present, AB=absent, hypo, hyper)	
RUQ	P
LUQ	P
RLQ	P
LLQ	P
Stool color	lt brown
Stool consistency	formed
Tubes/ostomies	NA
Genitourinary	
Urinary continence	yes
Urine source	clean catch
Appearance (clear, cloudy, yellow, amber, fluorescent, hematuria, orange, blue, tea)	clear, yellow
Integumentary	
Skin color	pale
Skin temperature (DI=diaphoretic, W☒ warm, dry, CL☒ cool, CLM☒ clammy, CD☒ ☒ cold, M☒ moist, H☒ hot)	W
Skin turgor (good, fair, poor, TENT☒ tenting)	good
Skin condition (intact, EC☒ ecchymosis, A☒ abrasions, P☒ petechiae, R☒ rash, W☒ weeping, S☒ sloughing, D☒ dryness, EX☒ excoriated, T☒ tears, SE☒ subcutaneous emphysema, B☒ blisters, V☒ vesicles, N☒ necrosis)	EC, A, R
Mucous membranes (intact, EC☒ ecchymosis, A☒ abrasions, P☒ petechiae, R☒ rash, W☒ weeping, S☒ sloughing, D☒ dryness, EX☒ excoriated, T☒ tears, SE☒ subcutaneous emphysema, B☒ blisters, V☒ vesicles, N☒ necrosis)	intact
Other components of Braden score: special bed, sensory pressure, moisture, activity, friction/shear (>18☒ no risk, 15–16=low risk, 13–14=moderate risk, ≤12=high risk)	15

McKinley, Chris, Male, 37 y.o.
Allergies: NKA **Code:** FULL **Isolation:** None
Pt. Location: RM 703 **Physician:** P Walker **Admit Date:** 2/23

Orders:
Vital Signs, Routine, Every 4 hours
CBC with differential, comprehensive metabolic profile; PT/PTT; EKG; Urinalysis
NPO after midnight

Nutrition:
Meal type: NPO
Intake % of meals: NPO
Fluid requirement: 1800–2000 mL

MD Progress Note:
2/24
Subjective: Chris McKinley's previous 24 hours reviewed
Vitals: Temp: 98.9 Pulse: 78 Resp rate: 24 BP: 115/70
Urine output: 2230 mL Point-of-Care Glu: 145

Physical Exam
HEENT: WNL
Neck: WNL
Heart: WNL
Lungs: Clear to auscultation
Abdomen: Obese, soft, some epigastric tenderness ☒ BS ☒ 4

Assessment/Plan:
POD#1 s/p Roux-en-Y gastric surgery—now with positive bowel sounds. Will progress to Stage 1 Bariatric Surgery Diet. If tolerated, discharge to home after nutrition consult. Schedule for postoperative visit in one week. P. Walker, MD

McKinley, Chris, Male, 37 y.o.
Allergies: NKA **Code:** FULL **Isolation:** None
Pt. Location: RM 703 **Physician:** P Walker **Admit Date:** 2/23

Intake/Output 410 = 186.3636

Date		**2/23 0701–2/24 0700**			
Time		0701–1500	1501–2300	2301–0700	Daily total
IN	P.O.	**0**	**60**	**100**	**160**
	I.V. (mL/kg/hr)	**680** (0.45)	**680** (0.45)	**680** (0.45)	**2040** (0.45)
	I.V. piggyback	**0**	**0**	**0**	**0**
	TPN	**0**	**0**	**0**	**0**
	Total intake (mL/kg)	**680** (3.6)	**740** (3.9)	**780** (4.2)	**2200** (11.8)
OUT	Urine (mL/kg/hr)	**700** (0.47)	**710** (0.47)	**820** (0.55)	**2230** (0.50)
	Emesis output	**0**	**0**	**0**	**0**
	Other	**0**	**0**	**0**	**0**
	Stool	**0**	**0**	**0**	**0**
	Total output (mL/kg)	**700** (3.7)	**710** (3.8)	**820** (4.4)	**2230** (12.0)
Net I/O		**−20**	**+30**	**−40**	**−30**
Net since admission (2/23)		**−20**	**+10**	**−30**	**−30**

McKinley, Chris, Male, 37 y.o.
Allergies: NKA **Code:** FULL **Isolation:** None
Pt. Location: RM 703 **Physician:** P Walker **Admit Date:** 2/23

Laboratory Results

	Ref. Range	2/23 1522
Chemistry		
Sodium (mEq/L)	136–145	138
Potassium (mEq/L)	3.5–5.1	5.8 !↑
Chloride (mEq/L)	98–107	99
Carbon dioxide (CO_2, mEq/L)	23–29	27
Bicarbonate (mEq/L)	23–28	25
BUN (mg/dL)	6–20	15
Creatinine serum (mg/dL)	0.6–1.1 F 0.9–1.3 M	0.9
BUN/Crea ratio	10.0–20.0	16.7:1
Uric acid (mg/dL)	2.8–8.8 F 4.0–9.0 M	5.2
Est GFR, non-Afr Amer (mL/min/1.73 m^2)	>60	95
Glucose (mg/dL)	70–99	145 ↑
Phosphate, inorganic (mg/dL)	2.2–4.6	3.9
Magnesium (mg/dL)	1.5–2.4	2.0
Calcium (mg/dL)	8.6–10.2	9.5
Osmolality (mmol/kg/H_2O)	275–295	289
Bilirubin total (mg/dL)	≤1.2	0.8
Bilirubin, direct (mg/dL)	<0.3	0.07
Protein, total (g/dL)	6–7.8	6.8
Albumin (g/dL)	3.5–5.5	4.2
Prealbumin (mg/dL)	18–35	22
Ammonia (NH_3, µmol/L)	6–47	11
Alkaline phosphatase (U/L)	30–120	118
ALT (U/L)	4–36	21
AST (U/L)	0–35	10
CPK (U/L)	30–135 F 55–170 M	220 !↑
Lactate dehydrogenase (U/L)	208–378	276
Cholesterol (mg/dL)	<200	320 !↑
HDL-C (mg/dL)	>59 F, >50 M	32 !↓

McKinley, Chris, Male, 37 y.o.
Allergies: NKA **Code:** FULL **Isolation:** None
Pt. Location: RM 703 **Physician:** P Walker **Admit Date:** 2/23

Laboratory Results *(Continued)*

	Ref. Range	2/23 1522
VLDL (mg/dL)	7–32	45 !↑
LDL (mg/dL)	<130	232 !↑
LDL/HDL ratio	<3.22 F <3.55 M	7.5 !↑
Triglycerides (mg/dL)	35–135 F 40–160 M	245 !↑
T_4 (µg/dL)	5–12	6.1
T_3 (µg/dL)	75–98	82
HbA_{1C} (%)	<5.7	7.2 !↑
Coagulation (Coag)		
PT (sec)	11–13	12
INR	0.9–1.1	0.95
PTT (sec)	24–34	26
Hematology		
WBC (⊠ $10^3/mm^3$)	3.9–10.7	10.2
RBC (⊠ $10^6/mm^3$)	4.2–5.4 F 4.5–6.2 M	5.5
Hemoglobin (Hgb, g/dL)	12–16 F 14–17 M	14.5
Hematocrit (Hct, %)	37–47 F 41–51 M	42
Mean cell volume ($µm^3$)	80–96	82
Mean cell Hgb (pg)	28–32	29
Mean cell Hgb content (g/dL)	32–36	33
RBC distribution (%)	11.6–16.5	12.3
Platelet count (⊠ $10^3/mm^3$)	150–350	261
Transferrin (mg/dL)	250–380 F 215–365 M	279
Ferritin (mg/mL)	20–120 F 20–300 M	210
Iron (µg/dL)	65–165 F 75–175 M	110

(Continued)

McKinley, Chris, Male, 37 y.o.
Allergies: NKA **Code:** FULL **Isolation:** None
Pt. Location: RM 703 **Physician:** P Walker **Admit Date:** 2/23

Laboratory Results *(Continued)*

	Ref. Range	2/23 1522
Total iron binding capacity (µg/dL)	240–460	269
Iron saturation (%)	15–50 F 10–50 M	15
Vitamin B_{12} (ng/dL)	24.4–100	72
Folate (ng/dL)	5–25	15
Urinalysis		
Collection method	---	clean catch
Color	---	yellow
Appearance	---	clear
Specific gravity	1.001–1.035	1.004
pH	5–7	6.1
Protein (mg/dL)	Neg	Neg
Glucose (mg/dL)	Neg	Neg
Ketones	Neg	Neg
Blood	Neg	Neg
Bilirubin	Neg	Neg
Nitrites	Neg	Neg
Urobilinogen (EU/dL)	<1.0	0
Leukocyte esterase	Neg	Neg
Prot chk	Neg	Neg
WBCs (/HPF)	0–5	0
RBCs (/HPF)	0–2	0
Bact	0	0
Mucus	0	0
Crys	0	0
Casts (/LPF)	0	0
Yeast	0	0

***Note**:* Values and units of measurement listed in these tables are derived from several resources. Substantial variation exists in the ranges quoted as "normal" and these may vary depending on the assay used by different laboratories.

Case Questions

I. Understanding the Diagnosis and Pathophysiology

1. Define the BMI and percent body fat criteria for the classification of obesity. What BMI is associated with morbid obesity?

2. List 10 health risks involved with untreated morbid obesity. What health risks does Mr. McKinley present with?

3. What are the standard adult criteria for consideration as a candidate for bariatric surgery? After reading Mr. McKinley's medical record, determine the criteria that allow him to qualify for surgery.

4. By performing an Internet search or literature review, find one example of a bariatric surgery program. Describe the information that is provided for the patient regarding qualification for surgery. Outline the personnel involved in the evaluation and care of the patient in this particular program.

5. Describe the following surgical procedures used for bariatric surgery, including advantages, disadvantages, and potential complications.

a. Roux-en-Y gastric bypass

b. Vertical sleeve gastrectomy

c. Adjustable gastric banding (Lap-Band®)

d. Vertical banded gastroplasty

e. Duodenal switch

f. Biliopancreatic diversion

6. Mr. McKinley has had type 2 diabetes for several years. His physician shared with him that after surgery he will not be on any medications for his diabetes and that he may be able to stop his medications for diabetes altogether. Describe the proposed effect of bariatric surgery on the pathophysiology of type 2 diabetes. What, if any, other medical conditions might be affected by weight loss?

II. Understanding the Nutrition Therapy

7. How does the Roux-en-Y procedure affect digestion and absorption? Do other surgical procedures discussed in question #5 have similar effects?

8. On post-op day one, Mr. McKinley was advanced to the Stage 1 Bariatric Surgery Diet. This consists of sugar-free clear liquids, broth, and sugar-free Jell-O. Why are sugar-free foods used?

9. Over the next two months, Mr. McKinley will be progressed to a pureed-consistency diet with 6–8 small meals. Describe the major goals of this diet for the Roux-en-Y patient. How might the nutrition guidelines differ if Mr. McKinley had undergone a Lap-Band procedure?

10. Mr. McKinley's RD has discussed the importance of hydration, protein intake, and intakes of vitamins and minerals, especially calcium, iron, and B_{12}. For each of these nutrients, describe why a deficiency may occur and explain the potential complications that could result from deficiency.

III. Nutrition Assessment

11. Assess Mr. McKinley's height and weight. Calculate his BMI and % usual body weight. What would be a reasonable weight goal for Mr. McKinley? Give your rationale for the method you used to determine this goal weight.

12. After reading the physician's history and physical, identify any signs or symptoms that are most likely a consequence of Mr. McKinley's morbid obesity.

13. Identify any abnormal biochemical indices and discuss the probable underlying etiology. How might they change after weight loss?

14. Determine Mr. McKinley's energy and protein requirements to promote weight loss. Explain the rationale for the method you used to calculate these requirements.

IV. Nutrition Diagnosis

15. Identify at least two pertinent nutrition problems and the corresponding nutrition diagnoses.

V. Nutrition Intervention

16. Determine the appropriate progression of Mr. McKinley's post–bariatric-surgery diet. Include recommendations for any supplementation that should be prescribed.

17. Describe any pertinent lifestyle changes that you would view as a priority for Mr. McKinley.

18. How would you assess Mr. McKinley's readiness for a physical activity plan? How does exercise assist in weight loss after bariatric surgery?

VI. Nutrition Monitoring and Evaluation

19. Identify the steps you would take to monitor Mr. McKinley's nutritional status postoperatively.

20. From the literature, what is the success rate of bariatric surgery? What patient characteristics may increase the likelihood for success?

21. Mr. McKinley asks you about the possibility of bariatric surgery for a young cousin who is 10 years old. What are the criteria for bariatric surgery in children and adolescents?

22. Write an ADIME note for your inpatient nutrition assessment with initial education for the Stage 1 and 2 (liquid) diet for Mr. McKinley.

Bibliography

Academy of Nutrition and Dietetics. Nutrition Care Manual. Bariatric surgery. https://www.nutritioncaremanual.org/topic.cfm?ncm_category_id= 1&lv1= 5545&lv2= 16927&ncm_toc_id= 16927. Accessed April 3, 2015.

Argyropoulos G. Bariatric surgery: Prevalence, predictors, and mechanisms of diabetes remission. *Curr Diab Rep*. 2015;15:15–24.

Bond DS, Thomas JG, King WC, et al. Exercise improves quality of life in bariatric surgery candidates: Results from the Bari-Active Trial. *Obesity*. 2015;23:536–542.

Bosnic G. Nutritional requirements after bariatric surgery. *Crit Care Nurs Clin N Am*. 2014;26:255–262.

Courcoulas AP, Yanovski SZ, Bonds D, et al. Long term outcomes of bariatric surgery: A National Institutes of Health symposium. *JAMA Surg*. 2014;149:1323–1329.

Egberts K, Brown WA, Brennan L, O'Brien PE. Does exercise improve weight loss after bariatric surgery? A systematic review. *Obes Surg*. 2012;22:335–341.

Handzlik-Orlik G, Holecki M, Orlik B, Wylezol M, Dulawa J. Nutrition management of the post-bariatric surgery patient. *Nutr Clin Pract*. 2014;29:18–739.

Ison KA, Andromalos L, Ariagno M, et al. Nutrition and metabolic support recommendations for the bariatric patient. *Nutr Clin Pract*. 2014;29:718–739.

Junior WS, Lopes do Amaral J, Nonino-Borges CB. Factors related to weight loss up to 4 years after bariatric surgery. *Obes Surg*. 2011;21:1724–1730.

Kalarchian M, Turk M, Elliott J, Gourash W. Lifestyle management for enhancing outcomes after bariatric surgery. *Curr Diab Rep*. 2014;14:530–539.

Lacey K. Diseases and disorders of weight balance. In: Nelms M, Sucher K, Lacey K, Long S. *Nutrition Therapy and Pathophysiology.* 3rd ed. Belmont, CA: Wadsworth, Cengage Learning; 2015:250–291.

Raftopoulos I, Bernstein B, O'Hara K, Ruby JA, Chhatrala R, Carty J. Protein intake compliance of morbidly obese patients undergoing bariatric surgery and its effect on weight loss and biochemical parameters. *Surgery for Obesity and Related Diseases*. 2011;7:733–742.

Shukla AP, Buniak WI, Aronne LJ. Treatment of obesity in 2015. *J CardioPulm Rehab Prev*. 2015;35:81–92.

Internet Resources

American Society for Metabolic and Bariatric Surgery: http://ASMBS.org
Bariatric Eating: www.bariatriceating.com
LapBand: www.lapband.com
Nutrition Care Manual: http://www.nutritioncaremanual.org
Obesity Help: www.obesityhelp.com
Realize: www.realize.com

Case 3

Malnutrition Associated with Chronic Disease

Objectives

After completing this case, the student will be able to:

1. Identify the signs and symptoms associated with malnutrition.
2. Discern the physiological differences among starvation, chronic disease-related malnutrition, and malnutrition associated with acute disease.
3. Develop a nutrition care plan—with appropriate measurable goals, interventions, and strategies for monitoring and evaluation—that addresses the nutrition diagnoses for this case.

Harry Campbell is a 68-year-old male admitted to acute care for possible dehydration, weight loss, generalized weakness, and malnutrition.

Campbell, Harry, Male, 68 y.o.
Allergies: NKA | **Code:** FULL | **Isolation:** None
Pt. Location: RM 1119 | **Physician:** F. Connors | **Admit Date:** 9/22

Patient Summary: Harry Campbell is a 68-year-old male admitted to acute care for possible dehydration, weight loss, generalized weakness, and malnutrition.

History:
Onset of disease: Patient diagnosed with squamous cell carcinoma of tongue five years ago. Patient previously treated with radiation therapy—no treatment × 3 years.
Medical history: Essential hypertension; hyperlipidemia; weight loss; primary tongue squamous cell carcinoma five years previous; peripheral vascular disease
Surgical history: s/p partial glossectomy five years ago
Medications at home: Lipitor 80 mg daily; Monopril 10 mg daily
Tobacco use: 1 ppd for 60 plus years
Alcohol use: 1–3 cans of beer per day
Family history: Mother died of pneumonia; father died of lung cancer.

Demographics:
Marital status: Married—lives with wife; *Spouse name*: Carol
Number of children: 2—alive, ages 42, 45
Years education: 9 years
Language: English only
Occupation: Electrician for 26 years; retired
Hours of work: N/A
Household members: Wife and patient
Ethnicity: Caucasian
Religious affiliation: Baptist

Admitting History/Physical:
Chief complaint: "I just feel weak all over and don't have the energy to do anything."
General appearance: Cachectic, appears older than 68 years of age

Vital Signs:

Temp: 96.6	Pulse: 101	Resp rate: 20
BP: 122/77	Height: 6'3"	Weight: 156 lbs

Heart: Regular rate and rhythm
HEENT: Head: Noted temporal wasting
Eyes: PERRLA
Ears: Clear
Nose: Dry mucous membranes with petechiae
Throat: Dry mucous membranes without exudates or lesions
Genitalia: Deferred
Neurologic: Alert and oriented; strength reduced
Extremities: Decreased muscle tone with normal ROM; loss of lean mass noted quadriceps and gastrocnemius; 1+ pedal edema
Skin: Warm and dry with ecchymoses

Campbell, Harry, Male, 68 y.o.
Allergies: NKA **Code:** FULL **Isolation:** None
Pt. Location: RM 1119 **Physician:** F. Connors **Admit Date:** 9/22

Chest/lungs: Respirations are shallow—clear to auscultation and percussion
Peripheral vascular: Diminished pulses bilaterally
Abdomen: Hypoactive bowel sounds × 4; nontender, nondistended

Nursing Assessment	9/22
Abdominal appearance (concave, flat, rounded, obese, distended)	flat
Palpation of abdomen (soft, rigid, firm, masses, tense)	soft
Bowel function (continent, incontinent, flatulence, no stool)	continent
Bowel sounds (P=present, AB=absent, hypo, hyper)	
RUQ	P, hypo
LUQ	P, hypo
RLQ	P, hypo
LLQ	P, hypo
Stool color	light brown
Stool consistency	soft
Tubes/ostomies	NA
Genitourinary	
Urinary continence	catheter
Urine source	catheter
Appearance (clear, cloudy, yellow, amber, fluorescent, hematuria, orange, blue, tea)	cloudy, amber
Integumentary	
Skin color	pale
Skin temperature (DI=diaphoretic, W=warm, dry, CL=cool, CLM=clammy, CD1=cold, M=moist, H=hot)	W, dry
Skin turgor (good, fair, poor, TENT=tenting)	TENT
Skin condition (intact, EC=ecchymosis, A=abrasions, P=petechiae, R=rash, W=weeping, S=sloughing, D=dryness, EX=excoriated, T=tears, SE=subcutaneous emphysema, B=blisters, V=vesicles, N=necrosis)	EC, D, T
Mucous membranes (intact, EC=ecchymosis, A=abrasions, P=petechiae, R=rash, W=weeping, S=sloughing, D=dryness, EX=excoriated, T=tears, SE=subcutaneous emphysema, B=blisters, V=vesicles, N=necrosis)	intact, D, P
Other components of Braden score: special bed, sensory pressure, moisture, activity, friction/shear (>18 = no risk, 15–16 = low risk, 13–14 = moderate risk, ≤12 = high risk)	friction/shear; 17

Orders:
0.9% sodium chloride with potassium chloride 20 mEq 125 mL/hr
Vancomycin 1 g in dextrose 200 mL IVPB

Campbell, Harry, Male, 68 y.o.
Allergies: NKA **Code:** FULL **Isolation:** None
Pt. Location: RM 1119 **Physician:** F. Connors **Admit Date:** 9/22

Thiamin injection 100 mg daily
Multivitamin capsule 1 Cap daily
Metronidazole 500 mg in NaCl premix IVPB
Docusate capsule 100 mg twice daily
Lipitor 80 mg daily
Monopril 10 mg daily

Nutrition:
Meal type: Mechanical soft diet
Intake % of meals: <5%; sips of liquids
Fluid requirement: 2000–2500 mL
History: Patient states that he has lost over 60 lbs in past 1–2 years. He lost some weight when diagnosed with cancer 5 years ago but held steady at approximately 220 lbs even after completing radiation therapy until 1–2 years ago, when he began losing weight. He states that he gets full really easily and never feels hungry.
Usual intake (for past several months): AM—egg, coffee, few bites of toast; 10 am—½ can Ensure Complete; lunch—soup or ½ sandwich, milk; dinner – few bites of soft meat, potatoes or rice. Tries to drink the other ½ can of Ensure Complete.

Intake/Output

Date		**9/22 0701–9/23 0700**			
Time		0701–1500	1501–2300	2301–0700	Daily total
IN	P.O.	**sips**	**120**	**240**	**360**
	I.V.	**720**	**720**	**720**	**2,160**
	(mL/kg/hr)	(1.3)	(1.3)	(1.3)	(1.3)
	I.V. piggyback				
	TPN				
	Total intake	**720**	**840**	**960**	**2,520**
	(mL/kg)	(10.2)	(11.8)	(13.5)	(35.5)
OUT	Urine	**480**	**320**	**643**	**1,443**
	(mL/kg/hr)	(0.8)	(0.6)	(1.1)	(0.8)
	Emesis output				
	Other				
	Stool	**1**			**1**
	Total output	**481**	**320**	**643**	**1,444**
	(mL/kg)	(6.8)	(4.5)	(9.1)	(20.4)
Net I/O		**+239**	**+520**	**+317**	**+1,076**
Net since admission (9/22)		**+239**	**+759**	**+1,076**	**+1,076**

Campbell, Harry, Male, 68 y.o.
Allergies: NKA **Code:** FULL **Isolation:** None
Pt. Location: RM 1119 **Physician:** F. Connors **Admit Date:** 9/22

Laboratory Results

	Ref. Range	9/22 1522
Chemistry		
Sodium (mEq/L)	136–145	150 !↑
Potassium (mEq/L)	3.5–5.1	3.5
Chloride (mEq/L)	98–107	106
Carbon dioxide (CO_2, mEq/L)	23–29	29
Bicarbonate (mEq/L)	23–28	24
BUN (mg/dL)	6–20	36 !↑
Creatinine serum (mg/dL)	0.6–1.1 F 0.9–1.3 M	1.4 !↑
Uric acid (mg/dL)	2.8–8.8 F 4.0–9.0 M	4.5
Glucose (mg/dL)	70–99	71
Phosphate, inorganic (mg/dL)	2.2–4.6	2.4
Magnesium (mg/dL)	1.5–2.4	1.9
Calcium (mg/dL)	8.6–10.2	8.4 !↓
Osmolality (mmol/kg/H_2O)	275–295	324 !↑
Protein, total (g/dL)	6–7.8	5.8 !↓
Albumin (g/dL)	3.5–5.5	1.8 !↓
Prealbumin (mg/dL)	18–35	9 !↓
Ammonia (NH_3, μg/L)	6–47	11
Alkaline phosphatase (U/L)	30–120	75
ALT (U/L)	4–36	31
AST (U/L)	0–35	24
CPK (U/L)	30–135 F 55–170 M	88
Cholesterol (mg/dL)	<200	112
HDL-C (mg/dL)	>59 F, >50 M	24 !↓
VLDL (mg/dL)	7–32	22
LDL (mg/dL)	<130	66
LDL/HDL ratio	<3.22 F <3.55 M	2.75

(Continued)

Campbell, Harry, Male, 68 y.o.
Allergies: NKA **Code:** FULL **Isolation:** None
Pt. Location: RM 1119 **Physician:** F. Connors **Admit Date:** 9/22

Laboratory Results *(Continued)*

	Ref. Range	9/22 1522
Triglycerides (mg/dL)	35–135 F 40–160 M	112
T_4 (μg/dL)	5–12	5.8
T_3 (μg/dL)	75–98	81
HbA_{1C} (%)	<5.7	5.3
Hematology		
WBC ($\times 10^3/mm^3$)	3.9–10.7	12.6 !↑
RBC ($\times 10^6/mm^3$)	4.2–5.4 F 4.5–6.2 M	2.4 !↓
Hemoglobin (Hgb, g/dL)	12–16 F 14–17 M	8.1 !↓
Hematocrit (Hct, %)	37–47 F 41–51 M	24.1 !↓
Mean cell volume (μm^3)	80–96	100.6 !↑
Mean cell Hgb (pg)	28–32	33.6 !↑
Mean cell Hgb content (g/dL)	32–36	33
RBC distribution (%)	11.6–16.5	18 !↑
Platelet count ($\times 10^3/mm^3$)	150–350	240
Transferrin (mg/dL)	250–380 F 215–365 M	382 !↑
Ferritin (mg/mL)	20–120 F 20–300 M	17 !↓
Hematology, Manual Diff		
Neutrophil (%)	40–70	55
Lymphocyte (%)	22–44	23
Monocyte (%)	0–7	4
Eosinophil (%)	0–5	0
Basophil (%)	0–2	0
Blasts (%)	3–10	4
Segs (%)	0–60	45
Bands (%)	0–10	10

Campbell, Harry, Male, 68 y.o.
Allergies: NKA **Code:** FULL **Isolation:** None
Pt. Location: RM 1119 **Physician:** F. Connors **Admit Date:** 9/22

Laboratory Results *(Continued)*

	Ref. Range	9/22 1522
Urinalysis		
Collection method	—	clean catch
Color	—	dark amber
Appearance	—	cloudy
Specific gravity	1.001–1.035	1.036 !↑
pH	5–7	6.9
Protein (mg/dL)	Neg	+ !↑
Glucose (mg/dL)	Neg	Neg
Ketones	Neg	+ !↑
Blood	Neg	Neg
Bilirubin	Neg	Neg
Nitrites	Neg	Neg
Urobilinogen (EU/dL)	<1.0	Neg
Leukocyte esterase	Neg	Neg
Prot chk	Neg	+ !↑
WBCs (/HPF)	0–5	3–4
RBCs (/HPF)	0–2	1–2
Bact	0	+ !↑
Mucus	0	0
Crys	0	0
Casts (/LPF)	0	0
Yeast	0	0

Note: Values and units of measurement listed in these tables are derived from several resources. Substantial variation exists in the ranges quoted as "normal" and these may vary depending on the assay used by different laboratories.

Case Questions

I. Understanding the Diagnosis and Pathophysiology

1. Outline the metabolic changes that occur during starvation/inadequate nutritional intake (not related to disease) that could result in weight loss.

2. Read the consensus statement of the Academy of Nutrition and Dietetics/American Society of Parenteral and Enteral Nutrition: Characteristics recommended for the identification and documentation of adult malnutrition. Explain the differences between malnutrition associated with chronic disease and malnutrition associated with acute illness and inflammation.

3. Find the current definitions of malnutrition in the United States using the ICD 10 codes. List all of them and describe the criteria for one of the diagnoses.

4. Current ICD definitions of malnutrition use biochemical markers as a component of the diagnostic criteria. Explain the effect of inflammation on visceral proteins and how that may impact the clinician's ability to diagnose malnutrition. What laboratory values may confirm the presence of inflammation?

II. Understanding the Nutrition Therapy

5. Mr. Campbell was ordered a mechanical soft diet when he was admitted to the hospital. Describe how his meals will be modified with this diet order.

6. What is the Ensure Complete supplement that was ordered? Determine additional options for Mr. Campbell that would be appropriate for a high-calorie, high-protein beverage supplement.

III. Nutrition Assessment

7. Assess Mr. Campbell's height and weight. Calculate his BMI and % usual body weight.

8. After reading the physician's history and physical, identify any signs or symptoms that support the diagnosis of malnutrition using the proposed definitions of malnutrition by AND/ASPEN malnutrition guidelines.

9. Evaluate Mr. Campbell's initial nursing assessment. What important factors noted in his nutrition assessment may support the diagnosis of malnutrition?

10. What is a Braden score? Assess Mr. Campbell's score. How does this relate to his nutritional status?

11. Identify any signs (including laboratory values) or symptoms from the physician's history and physical and from the nursing assessment that are consistent with dehydration.

12. Determine Mr. Campbell's energy and protein requirements. Explain the rationale for the method you used to calculate these requirements.

13. Determine Mr. Campbell's fluid requirements. Compare this with the information on the intake/output report.

14. From the nutrition history, assess Mr. Campbell's usual dietary intake. How does this compare to the requirements that you calculated for him? Can your evaluation of his dietary intake contribute to the evidence for diagnosing malnutrition?

IV. Nutrition Diagnosis

15. Identify the pertinent nutrition problems and the corresponding nutrition diagnoses and write at least two PES statements, with one focused on the clinical domain.

V. Nutrition Intervention

16. Determine the appropriate intervention for each nutrition diagnosis.

VI. Nutrition Monitoring and Evaluation

17. Identify the steps you would take to monitor Mr. Campbell's nutritional status while he is hospitalized. How would this differ if you were providing follow-up care through his physician's office?

18. Write your ADIME note for this initial nutrition assessment for Mr. Campbell.

Bibliography

Corkins MR, Guenter P, DiMaria-Ghalilli RA, Jensen GL, et al. Malnutrition diagnoses in hospitalized patients: United States, 2010. *JPEN*. 2014;38:186–195.

Giannopoulous GA, Merriman LR, Ramsey A, Zweibel DS. Malnutrition coding 101: Financial impact and more. *Nutr Clin Pract*. 2013;28:698–709.

Jensen GL, Mirtallo J, Compher C, et al. Adult starvation and disease related malnutrition: A proposal for etiology-based diagnosis in the clinical practice setting from the International Consensus Guideline Committee. *Clinical Nutrition*. 2010;29:151–153.

Jensen GL, Wheeler D. A new approach to defining and diagnosing malnutrition in adult critical illness. *Curr Opin Crit Care.* 2012;18:206–211.

Malone A, Hamilton C. The Academy of Nutrition and Dietetics/The American Society for Parenteral and Enteral Nutrition Consensus Malnutrition Characteristics: Application in practice. *Nutr and Clin Pract*. 2013;28:639–650.

Nahikian-Nelms ML. Metabolic stress and the critically ill. In: Nelms M, Sucher K, Lacey K. *Nutrition Therapy and Pathophysiology.* 3rd ed. Belmont, CA: Cengage Learning; 2016:682–701.

Nahikian-Nelms ML, Habash D. Nutrition assessment: Foundation of the nutrition care process. In: Nelms M, Sucher K, Lacey K. *Nutrition Therapy and Pathophysiology.* 3rd ed. Belmont, CA: Cengage Learning; 2016:34–65.

Nicolo M, Compher C, Still C, Huseini M, Dayton S, Jensen GL. Feasibility of accessing data in hospitalized patients to support the diagnosis of malnutrition by the Academy-ASPEN malnutrition consensus recommended clinical characteristics. *Nutr Clin Pract*. 2013;28:639–650.

Tappendan KA, Quatrara B, Parkhurst ML, Malone AM, Fanjang G, Zeigler TR. Critical role of nutrition in improving quality of care: An interdisciplinary call to action to address adult hospital malnutrition. *JPEN*. 2013;17:482–497.

White JV, Guenter P, Jensen G, Malone A, Schofield M, Academy of Nutrition and Dietetics Malnutrition Work Group, A.S.P.E.N. Malnutrition Task Force, A.S.P.E.N. Board of Directors. Consensus statement of the Academy of Nutrition and Dietetics/American Society of Parenteral and Enteral Nutrition: Characteristics recommended for the identification and documentation of adult malnutrition. *J Acad Nutr Diet.* 2012;112:730–738.

Internet Resources

AND Evidence Analysis Library: http://www.adaevidencelibrary.com

Alliance to Advance Patient Nutrition: http://malnutrition.com

Prevention Plus Braden Scale: http://www.bradenscale.com

Centers for Medicare and Medicaid Services, ICD 10: http://cms.gov/Medicare/Coding/ICD10/index.html

Nutrition Care Manual: http://www.nutritioncaremanual.org

USDA SuperTracker: http://www.choosemyplate.gov/supertracker-tools/supertracker.html

Unit Two

NUTRITION THERAPY FOR CARDIOVASCULAR DISORDERS

Cardiovascular disease accounts for over 30% of all deaths in the United States. Risk factors for cardiovascular disease include dyslipidemia, smoking, diabetes mellitus, high blood pressure, obesity, and physical inactivity. Researchers estimate that more than 80 million Americans have one or more forms of cardiovascular disease; as a result, many patients that the health care team encounters will have conditions related to cardiovascular disease. Extensive health care costs for cardiovascular disease provide an important impetus to intervention and treatment with medical nutrition therapy.

This section includes three of the most common diagnoses: hypertension (HTN), myocardial infarction (MI), and heart failure (HF). All these diagnoses require a significant medical nutrition therapy component for their care.

Over 74 million people in the United States have hypertension. Stage One hypertension is defined as a systolic blood pressure of 140 mm Hg or higher and a diastolic pressure of 90 mm Hg or higher. Essential hypertension, which is the most common form of hypertension, is of unknown etiology. Case 4 focuses on lifestyle modifications as the first step in treatment of hypertension accompanied by dyslipidemia in a female patient. This case incorporates the pharmacological treatment of hypertension, and you will use the well-validated *Dietary Approaches to Stop Hypertension* (DASH) as the center of the medical nutrition therapy intervention. The 2015 *Dietary Guidelines* provide additional support for modification of sodium intake to assist with nutrition therapy. Because cardiovascular disease is a complex, multifactorial condition, Case 4 provides the opportunity to evaluate these multiple risk factors through all facets of nutrition assessment. We specifically emphasize interpretation of laboratory indices for dyslipidemia. In this case, you will also determine the clinical classification and treatment of abnormal serum lipids, explore the use of drug therapy to treat dyslipidemias, and develop appropriate nutrition interventions using the most recent nutrition recommendations including the Mediterranean Diet.

Case 5 focuses on the acute care of an individual suffering a myocardial infarction (MI). Ischemia of the vessels within the heart results in death of the affected heart tissue. This case lets you evaluate pertinent assessment measures for the individual suffering an MI and then develop an appropriate nutrition care plan for lifestyle behavior change that complements the medical care for prevention of further cardiac deterioration.

Case 6 addresses the long-term consequences of cardiovascular disease in a patient suffering from heart failure (HF). In HF, the heart cannot pump effectively, and the lack of oxygen and nutrients affects the body's tissues. HF is a major public health problem in the United States, and its incidence is increasing. Without a heart transplant, long-term prognosis is poor. This advanced case requires you to integrate understanding of the physiology of several body systems as you address heart failure's metabolic effects including cardiac cachexia, with its significant effect on nutritional status.