



Educational Outcomes, Goals, and Objectives for Postgraduate Year Two (PGY2) Pharmacy Residencies in Nutrition Support

Overview of PGY2 Pharmacy Residencies in Nutrition Support

The PGY2 pharmacy residency in nutrition support is designed to transition PGY1 residency graduates from generalist practice to specialized practice focused on the care of patients who require specialized nutrition support. Residency graduates are equipped to participate as integral members of interdisciplinary teams caring for the specialized nutrition support needs of individuals with a broad range of patient diagnoses, in various levels of care, and across the full range of developmental stages from neonatal to geriatric. They are experts in the preparation and distribution of specialized nutrition support formulations and the devices used in their administration. Further, their extensive experience with the most complex specialized nutrition support needs qualifies them to successfully serve health care organizations as an authoritative resource for care of patients receiving specialized nutrition support, including formulary decision-making on enteral and parenteral products, and the development and implementation of clinical pathways and guidelines. They are prepared to actively participate with other health care professionals in the selection of devices for administration of specialized nutrition support products and in the design and implementation of technology and information systems.

Nutrition support pharmacy residency graduates exhibit the characteristics of practice leaders. They are experienced in writing about and presenting on specialized nutrition support-related topics. They are effective advocates for the needs of patients who require specialized nutrition support. They can be expected to continue their pursuit of expertise in practice; to possess advanced skills to identify the pharmacotherapy and medication-use training needs of other health care professionals caring for individuals who require specialized nutrition support; to deliver effective training to those health care professionals; and to contribute to public health efforts for health improvement, wellness, and prevention of nutritional problems.

Explanation of the Contents of This Document:

Each of the document's objectives has been classified according to educational taxonomy (cognitive, affective, or psychomotor) and level of learning. An explanation of the taxonomies is available elsewhere.¹

The order in which the required educational outcomes are presented in this document does not suggest relative importance of the outcome, amount of time that should be devoted to teaching the outcome, or sequence for teaching.

¹ Nimmo, CM. Developing training materials and programs: creating educational objectives and assessing their attainment. In: Nimmo CM, Guerrero R, Greene SA, Taylor JT, eds. Staff development for pharmacy practice. Bethesda, MD: ASHP; 2000.



The educational outcomes, goals, and objectives are divided into those that are required and those that are elective. The required outcomes, including all of the goals and objectives falling under them, must be included in the design of all programs. The elective outcomes are provided for those programs that wish to add to the required outcomes. Programs selecting an elective outcome are not required to include all of the goals and objectives falling under that outcome. In addition to the potential elective outcomes contained in this document, programs are free to create their own elective outcomes with associated goals and objectives. Other sources of elective outcomes may include elective educational outcomes in the list provided for PGY1 pharmacy residencies and educational outcomes for training in other PGY2 areas. Each of the goals falling under the program's selection of program outcomes (required and elective) must be evaluated at least once during the resident's year.

Educational Outcomes (Outcome): Educational outcomes are statements of broad categories of the residency graduates' capabilities.

Educational Goals (Goal): Educational goals listed under each educational outcome are broad sweeping statements of abilities.

Educational Objectives (OBJ): Resident achievement of educational goals is determined by assessment of the resident's ability to perform the associated educational objectives below each educational goal.

Instructional Objectives (IO): Instructional objectives are the result of a learning analysis of each of the educational objectives. They are offered as a resource for preceptors encountering difficulty in helping residents achieve a particular educational objective. The instructional objectives falling below the educational objectives suggest knowledge and skills required for successful performance of the educational objective that the resident may not possess upon entering the residency year. Instructional objectives are teaching tools only. They are not required in any way nor are they meant to be evaluated.

Required Educational Outcomes, Goals, and Objectives for Postgraduate Year Two (PGY2) Pharmacy Residencies in Nutrition Support
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Outcome R1: Serve as an authoritative resource on the optimal use of specialized nutrition support and medications affecting that therapy.

Goal R1.1 Select core biomedical literature resources appropriate for nutrition support pharmacy practice.

OBJ R1.1.1 (Application) Use knowledge of standard resources to select core primary, secondary, and tertiary biomedical literature resources appropriate for nutrition support pharmacy practice.

Goal R1.2 Contribute the nutrition support pharmacy practice perspective to technology and automation systems decisions.

OBJ R1.2.1 (Synthesis) When appropriate, participate in the organization's design of its technology and automation systems.

IO Explain the nutrition support pharmacy specialist's role in contributing to the design of technology systems (e.g., CPOE, PDAs, software) for the organization.

IO Explain the nutrition support pharmacy specialist's role in contributing to decisions regarding automation systems (e.g., smart pumps, automated compounders).

Goal R1.3 Establish oneself as an organizational expert for nutrition support pharmacy-related information and resources.

OBJ R1.3.1 (Synthesis) Implement a successful strategy for earning credibility within the organization to be an authoritative resource on the pharmaceutical care of individuals requiring specialized nutrition support.

IO Identify barriers to the nutrition support pharmacy specialist for earning credibility with the range of health care providers external to one's organization involved with the care of specialized nutrition support patients.

IO Identify barriers to the nutrition support pharmacy specialist for earning credibility with other members of the nutrition support service.

IO Identify barriers to the nutrition support pharmacy specialist for earning credibility within the organization.

Goal R1.4 Employ advanced literature analysis skills in preparing drug information.

OBJ R1.4.1 (Synthesis) Create an efficient and effective advanced search strategy to prepare a drug information response related to the care of individuals requiring specialized nutrition support.

IO Explain the full range of nutrition support-related information resources that are currently available.

IO Explain content and applicability of the above mentioned specialized sources of drug information.

IO Explain the principles for use of search engines when the search needs to be at an advanced level.



- OBJ R1.4.2 (Analysis) Accurately identify the study design employed for a piece of biomedical literature.
IO Explain the key features of epidemiological and experimental study designs and the strengths and weaknesses of each.
- OBJ R1.4.3 (Evaluation) Determine if the study design and methodology are appropriate to accomplish the objectives of a piece of biomedical literature.
IO Explain the effects on study outcomes of various types of samples and methods of biochemical assay and quality assurance procedures.
IO State factors that affect the accuracy of nutrient assays.
- OBJ R1.4.4 (Evaluation) Accurately interpret statistical information presented in a piece of biomedical literature.
IO Explain the application and interpretation of advanced statistical methods.
IO Determine instances in which a study conclusion is erroneously supported by data display.
- OBJ R1.4.5 (Analysis) Identify potential sources of bias in a piece of biomedical literature.
- OBJ R1.4.6 (Evaluation) Determine the internal and external validity of a piece of biomedical literature.
IO Explain reliability and validity issues surrounding specialized nutrition support studies (e.g., difficulty of controlling subjects' diet, ethical issues, blinding).
- OBJ R1.4.7 (Evaluation) Determine if a study's results have applicability for hypothesizing future research or for directing patient care decisions.
IO Explain the determinants of clinical significance in a specialized nutrition support study.
- OBJ R1.4.8 (Evaluation) When presented with conflicting biomedical literature, determine the validity and applicability for a specific specialized nutrition support information need.
IO Compare and contrast the reputations and peer-review procedures of biomedical journals.
IO Explain how to appraise biomedical information for the expertise and reputation of the author(s).
- OBJ R1.4.9 (Evaluation) When presented with limited evidence-based biomedical literature, synthesize a reasonable response for the specific specialized nutrition support information need.
- OBJ R1.4.10 (Evaluation) Appraise information provided by a pharmaceutical manufacturer.
- OBJ R1.4.11 (Synthesis) Prepare an expert response to a complex specialized nutrition support information need.
IO Identify standards of care or guidelines applicable to a specific specialized nutrition support information need.
- Goal R1.5 Assist the organization in achieving compliance with accreditation, legal, regulatory, and safety requirements related to the use and preparation of specialized nutrition support (e.g., The Joint Commission requirements; ASHP



and A.S.P.E.N. standards, statements, and guidelines; state and federal laws regulating pharmacy practice; USP Chapter 797 requirements; OSHA regulations).

OBJ R1.5.1 (Evaluation) Determine appropriate activities and documentation to meet accreditation, legal, regulatory, and safety requirements for a specialized nutrition support pharmacy.

IO Explain the influence of accreditation, legal, regulatory, and safety requirements on clinical practice.

Goal R1.6 Identify opportunities for improving the safety aspects of the organization’s medication-use system.

OBJ R1.6.1 (Evaluation) When applicable, participate in the organization’s evaluation of and response to a medication-related event occurring in a patient receiving specialized nutrition support.

OBJ R1.6.2 (Comprehension) Explain the nutrition support pharmacy specialist’s role in the development of emergency protocols for public health disasters (e.g., natural disaster, bioterrorism, epidemic).

Outcome R2: Optimize the care of patients receiving specialized nutrition support by providing evidence-based, patient centered pharmaceutical care using an interdisciplinary approach.

(A residency in nutrition support pharmacy is dependent upon the availability of a broad range of patient diagnoses and levels of care [e.g., critical care, acute care, subacute care, and self-care] as well as patients across a variety of developmental stages [i.e., neonatal, pediatric, adolescent, adult, geriatric])





Communicate ongoing patient information



Document direct patient care activity

Goal R2.1 Establish collaborative professional relationships with the range of health care professionals providing care to patients requiring specialized nutrition support.

OBJ R2.1.1 (Synthesis) Implement a strategy that effectively establishes cooperative, collaborative, and communicative working relationships with health care professionals providing care to patients requiring specialized nutrition support.

IO Explain the training and expected areas of expertise of those health care professionals with whom one works.

IO For each of the professions with which one interacts in the care of patients requiring specialized nutrition support, explain the profession's view of its role and responsibilities and their expectations of the pharmacist's role in collaborations on patient-centered care.

IO Explain the professional dynamics of the different services that contribute to the care of individuals requiring specialized nutrition support.

IO Identify the interpersonal dynamics of the health care professionals with whom one works.

Goal R2.2 Establish collaborative pharmacist-patient and pharmacist-caregiver relationships.

OBJ R2.2.1 (Synthesis) Formulate a strategy that effectively establishes a patient-centered pharmacist-patient or a pharmacist-caregiver relationship.

IO Explain problems associated with emotional attachments between health care professionals and patients.

IO Explain the importance of considering the patient's educational level when communicating with patients who may require specialized nutrition support.

IO Explain the importance of including in the strategy an explanation to the patient and/or caregiver of the nutrition support pharmacy specialist's role in his/her care.

IO Explain the impact of fear, anger, depression, loss, grief and their opposites on patients' perception of their health status.

IO Explain the impact of fear, anger, depression, loss, grief and their opposites on the pharmacist's approach to caring for individuals requiring specialized nutrition support.

IO Explain the view of diverse cultures and religions on the conceptualization of illness, treatment, death, and dying.

IO Explain modifications to communication strategies that can be effective in working with caregivers of individuals requiring specialized nutrition support.

Goal R2.3 Collect and analyze patient information.

OBJ R2.3.1 (Analysis) Collect and organize all patient-specific information needed by the nutrition support pharmacy specialist to make appropriate evidence-based, patient-centered nutrition support therapy recommendations. (See Appendix)

IO Identify the types of patient-specific information the nutrition support pharmacy specialist requires to anticipate, prevent, detect, and/or resolve problems related to specialized nutrition support and to make appropriate evidence-based, patient-centered nutrition support therapy recommendations for individuals who require it.

- IO Explain components of a dietary history.*
 - IO Explain signs and symptoms, epidemiology, risk factors, etiology, pathogenesis, natural history of disease, pathophysiology, clinical course, effect of nutritional status, and treatment of diseases commonly encountered in nutrition support practice.*
 - IO Explain the effects of medical and surgical therapies on nutritional status.*
 - IO Explain the composition, physical characteristics, nutritional contribution, typical regimen (dose, schedule, route, and method of administration), indications, contraindications, compatibility, stability, cost, and adverse reactions associated with macronutrients used in specialized nutrition formulations.*
 - IO Explain the composition, physical characteristics, typical regimen (dose, schedule, route, and method of administration), indications, contraindications, compatibility, stability, cost, and adverse reactions associated with micronutrients used in specialized nutrition formulations.*
 - IO Explain the role of and how to conduct an abdominal exam and anthropometric measurements for a patient.*
 - IO Use physical assessment skills to identify signs and symptoms of malnutrition, including evidence of abnormal macronutrient and/or micronutrient status.*
 - IO Explain features of subjective global assessment and other assessment tools.*
 - IO Explain the function and impact on therapy of the various access devices used for specialized nutrition support.*
- OBJ R2.3.2 (Analysis) Determine the presence of any of the following nutrition-related problems:
1. Specialized nutrition support is used with no medical indication.
 2. Patient has conditions responsive to nutritional intervention for which there is no nutrition therapy prescribed.
 3. Nutrition substrate or nutrition support is prescribed inappropriately for a particular medical condition.
 5. Nutrition therapy regimen (formulation, dose, schedule, route of administration, method of administration) is not completely appropriate and requires adjustment of some component.
 6. There is therapeutic duplication of medications or nutrients.
 7. Nutrition substrate or medication to which the patient is allergic or sensitive has been prescribed.
 8. There are adverse nutritional substrate- or device-related events or potential for such events.
 9. There are clinically significant drug-drug, drug-disease, drug-nutrient, nutrient-laboratory test, or drug-laboratory test interactions or potential for such interactions.
 10. Nutrition support therapy has been interfered with by social, recreational, nonprescription, complementary, or alternative drug use by the patient or others.

11. Patient is not receiving the full benefit from the prescribed specialized nutrition support therapy.
12. There are problems arising from the financial impact of nutrition support therapy on the patient or caregiver.
13. The patient or caregiver lacks understanding of specialized nutrition support therapy.
14. The patient or caregiver is not adhering to the prescribed specialized nutrition support regimen.

IO Explain the metabolic response of the body to specialized nutrition support.

IO Explain the nutritional response of the body to specialized nutrition support.

IO Explain the availability of financial support (i.e., insurance coverage) to patients versus patient responsibility to pay for various nutrition support products in alternate patient care sites.

IO Explain the impact of schedule on adherence to specialized nutrition support regimens in the range of care sites serving specialized nutrition support patients.

IO Explain factors to consider when comparing the benefits and risks of different specialized nutrition support therapies.

IO Explain factors to consider when determining the likelihood that a reaction is occurring because of a nutrition therapy.

IO Explain acceptable approaches to the therapeutic management of one or more substrate intolerances.

IO Explain systematic procedures for detecting defects in parenteral and enteral formulations and delivery devices.

IO Explain the requirements for a nutritionally adequate diet based on recommendations from various nationally recognized organizations (e.g., National Academy of Sciences, American Heart Association, American Cancer Society, American Diabetes Association, American Dietetic Association).

IO Explain the anatomy and physiology of the gastrointestinal tract across all developmental stages.

IO Explain normal ingestion, digestion, absorption, metabolism, and excretion of nutrients.

IO Explain the effects of psychosocial and socioeconomic factors on nutrition status.

OBJ R2.3.3 (Analysis) Using an organized collection of patient-specific information, summarize the health care needs of an individual who may require specialized nutrition support.

IO Explain social and environmental factors affecting the delivery of health care that should be considered when defining the health care needs of patients served in home care.



IO Explain how to use guidelines (e.g., the A.S.P.E.N. "Guidelines for the Use of Parenteral and Enteral Nutrition in Adult and Pediatric Patients") to determine the suitability of a patient for specialized nutrition support.

- Goal R2.4 When necessary, make and follow up on referrals/consults.
- OBJ R2.4.1 (Evaluation) When presented with an individual with health care needs that cannot be met by the nutrition support service, make a referral/consult to the appropriate health care provider based on the patient's acuity and the presenting problem.
 - OBJ R2.4.2 (Synthesis) Devise a plan for follow-up of a referral/consult.
- Goal R2.5 Design a specialized nutrition support regimen.
- OBJ R2.5.1 (Synthesis) Specify nutrition goals for a specialized nutrition support patient, incorporating the principles of evidence-based medicine that integrate patient-specific data, disease and medication-specific information, ethics, and quality-of-life considerations.
 - IO Identify the sources of specialized nutrition support guidelines, consensus statements, and evidence-based meta-analyses currently used in nutrition support practice.*
 - IO Explain the impact of quality-of-life issues on making decisions about nutrition goals for specialized nutrition support patients.*
 - IO Explain ethical issues that may need consideration when setting nutrition goals for specialized nutrition support patients.*
 - IO Compare and contrast the realistic limits of specialized nutrition support outcomes in the range of care sites serving specialized nutrition support patients.*
 - IO Explain how a patient's age or mental status might affect the setting of nutrition goals for specialized nutrition support patients.*
 - IO Explain how to estimate a patient's caloric requirements using various predictive equations and methods of indirect measurement (e.g., indirect calorimetry, Fick equation).*
 - IO Explain how to determine a patient's protein requirements using each of the following methods and the limitations of each method: (1) nitrogen balance, (2) urea kinetics, (3) estimate of nitrogen losses via various types of dialysis, and (4) a combination of body weight, organ function, and metabolic stress, and (5) tracer methods to measure protein synthesis and degradation.*
 - IO Explain how to estimate a patient's fluid requirements by considering each of the following factors: (1) weight, (2) age, (3) inputs and outputs, (4) organ functions, (5) disease state, and (6) laboratory values.*
 - IO Explain how to estimate a patient's micronutrient requirements by considering each of the following factors: (1) weight, (2) age, (3) inputs and outputs, (4) organ functions, (5) disease state, (6) drug-nutrient interactions, and (7) laboratory values.*
 - OBJ R2.5.2 (Synthesis) Design a patient-centered specialized nutrition support regimen that meets the evidence-based nutrition goals established for a patient; integrates patient-specific information, disease and drug information, ethical issues and quality-of-life issues; and considers pharmacoeconomic principles.

- IO *Explain applicable sections of the A.S.P.E.N. “Guidelines for the Use of Parenteral and Enteral Nutrition in Adult and Pediatric Patients” or other appropriate guidelines.*
- IO *Explain additional concerns with adherence, cost, and route of administration when making decisions on specialized nutrition support for patients in the range of sites serving patients who require specialized nutrition support.*
- IO *Explain the relationship between dietary reference intake values [RDA, Adequate Intake (AI), and Tolerable Upper Limits] and IV requirements for nutrients.*
- IO *Explain present and potential future adjuvant therapies to enhance nutrient metabolism.*
- IO *Explain therapeutic considerations for co-administration of medications and specialized nutrition support.*
- IO *Explain mechanical considerations for co-administration of medications and specialized nutrition support.*
- IO *Explain the effects of "hang time" on stability and infectious risk associated with specialized nutrition support.*
- IO *Explain factors to consider when determining the appropriate access device, including mechanical and infectious complications, gastrointestinal function, cost, and maintenance requirements.*
- IO *Explain options for treating infectious complications related to specialized nutrition support (e.g., antibiotics, TPA, antibiotic locks, ethanol locks, line removal).*
- IO *Explain options for treating mechanical complications related to specialized nutrition support.*
- IO *Explain factors to consider when choosing a cyclic schedule for parenteral nutrition.*
- IO *Explain factors to consider when choosing intermittent, cyclic, bolus, or continuous enteral feedings.*
- IO *Explain the theory upon which formulations commercially marketed for specific disease states and conditions for parenteral and enteral nutrition support are based and the level of evidence supporting the use of these products.*
- IO *Explain the consequences of underfeeding and overfeeding.*
- IO *Explain the concept of permissive underfeeding.*

Goal R2.6 Design evidence-based monitoring plans for individuals requiring specialized nutrition support.

OBJ R2.6.1 (Synthesis) Design a patient-centered, evidenced-based monitoring plan for a specialized nutrition support regimen that effectively evaluates achievement of the nutrition goals set for a patient.

- IO *Explain the significance and application of outcome indicators associated with specialized nutrition support (e.g., wound healing, measurements of strength, length of stay, morbidity, mortality, nutrition status).*

- IO Explain the importance of considering what is feasible and useful when designing a monitoring plan for specialized nutrition support.*
- IO Explain optimal monitoring parameters for enteral and for parenteral nutrition support in a given situation.*
- IO Explain the relationship between the normal value ranges for parameters used in specialized nutrition support monitoring and the influence on those ranges by a given disease state, nutrition aberration, stress, or medication.*
- IO Identify the most reliable sources of data for measuring selected parameters in specialized nutrition support patients.*
- IO Explain the effects of nutrition status on drug pharmacokinetics and pharmacodynamics.*
- IO Explain the effects of specialized nutrition support on drug pharmacokinetics and pharmacodynamics.*
- IO Explain social issues that should be considered when designing a monitoring plan for a home care patient.*

Goal R2.7 Recommend or communicate regimens and monitoring plans for individuals requiring specialized nutrition support.

OBJ R2.7.1 (Application) Recommend a patient-centered, evidence-based specialized nutrition support regimen and corresponding monitoring plan to other involved health care professionals in a way that is systematic, logical, accurate, timely, succinct, and secures consensus from the group.

OBJ R2.7.2 (Application) When appropriate, discuss the proposed patient-centered, evidence-based specialized nutrition support regimen and corresponding monitoring plan with the patient and/or caregiver in a way that is systematic, logical, comprehensible, accurate, timely, sensitive, and secures consensus from the patient and/or caregiver.

- IO Explain the kinds of issues that require particular sensitivity when discussing treatment plans with individuals requiring specialized nutrition support and/or their caregivers.*

Goal R2.8 Implement regimens and monitoring plans for individuals requiring specialized nutrition support.

OBJ R2.8.1 (Application) When appropriate, initiate the patient-centered, evidence-based specialized nutrition support regimen and monitoring plan according to the organization's policies and procedures.

- IO Explain the organization's policies and procedures for ordering specialized nutrition support in the range of care sites serving specialized nutrition support patients.*

- IO Explain the organization's policies and procedures for ordering monitoring, including laboratory tests, point-of-care tests (e.g., capillary glucose), and nursing orders (e.g., weights, I/O, care of access devices).*

OBJ R2.8.2 (Complex Overt Response) When appropriate, exercise skill in the supervision of the administration of a specialized nutrition support regimen.

- IO Explain the characteristics of various types of infusion control devices and filters.*

- IO *Explain the advantages and disadvantages of different types of venous access devices.*
- IO *Explain the advantages and disadvantages of different types of enteral access devices.*
- IO *Explain methods for treating venous access device occlusion.*
- IO *Explain factors that cause venous access device occlusion.*
- IO *Explain appropriate site care for various types of venous access devices.*
- IO *Explain strategies for preventing occlusion of feeding tubes.*
- IO *Explain methods for restoring patency to occluded feeding tubes.*

OBJ R2.8.3 (Application) When necessary, contribute to the work of the team that secures reimbursement for the specialized nutrition support regimen.

- IO *Explain the pharmacist's role (versus other health care professionals) in securing payer coverage or patient assistance.*
- IO *Explain circumstances in which it may be appropriate to redesign a patient's specialized nutrition support regimen in order to ensure that a patient will have financially viable access to the prescribed regimen.*
- IO *Explain various approaches used to adjust specialized nutrition support regimens in order to facilitate patient access to the prescribed therapy.*
- IO *Explain organizational policies and procedures for securing compassionate use nutrition-related products needed for an individual patient.*
- IO *Explain guidelines for governmental health care insurance as they affect specialized nutrition support.*
- IO *Explain the principles of health insurance coverage of specialized nutrition support.*

OBJ R2.8.4 (Synthesis) Use effective patient education techniques to provide nutrition-related counseling to a patient requiring specialized nutrition support and/or the patient's caregiver(s).

- IO *Identify resources for prepared materials designed for the education of individuals requiring specialized nutrition support and their caregivers.*
- IO *Compare and contrast the information needed by specialized nutrition support patients and their caregivers in the range of care sites serving specialized nutrition support patients.*
- IO *Explain the affect of component stability on product handling, storage, and need to add components just prior to administration of specialized nutrition support formulations.*
- IO *Explain the purpose and services of the Oley Foundation and other organizations pertinent to the care of individuals requiring specialized nutrition support.*

Goal R2.9 Evaluate the progress of individuals requiring specialized nutrition support and redesign regimens and monitoring plans.

OBJ R2.9.1 (Evaluation) Accurately assess progress toward a patient's nutrition goal(s).

- IO *Explain the etiology of pathophysiological complications (e.g., hepatobiliary complications, micronutrient deficiencies, hyperglycemia, acid-base disorders) associated with specialized nutrition support.*
- IO *Explain the management of pathophysiological complications (e.g., hepatobiliary complications, micronutrient deficiencies, hyperglycemia, acid-base disorders) associated with specialized nutrition support.*
- IO *Explain factors that may contribute to erroneous lab values in the range of care sites serving specialized nutrition support patients and how to recognize them.*
- OBJ R2.9.2 (Application) Ensure that accurate and timely nutrition support-specific information regarding a patient reaches those who need it at the appropriate time.
 - IO *Explain the organization's system for communicating urgent patient information.*
- OBJ R2.9.3 (Synthesis) Redesign the patient's specialized nutrition support regimen and monitoring plan as necessary based on evaluation of monitoring data and nutrition outcomes.
- Goal R2.10 Communicate ongoing patient information to facilitate continuity of care.
 - OBJ R2.10.1 (Synthesis) Formulate a strategy for continuity of specialized nutrition support care across the continuum of care.
 - IO *Explain potential problems that may place individuals requiring parenteral or enteral nutrition support at risk in various treatment settings (e.g., home health, hospice, rehabilitation, long-term care, primary care) or upon change in level of care.*
 - IO *Explain accrediting organizations' requirements for medication reconciliation across the continuum of care.*
 - IO *Explain methods for coordinating information between multiple pharmacy and other health care workers serving the needs of individuals requiring specialized nutrition support that will facilitate the provision of that support.*
 - IO *Explain continuity of care issues that may arise when unique specialized nutrition support formulations used in the acute care setting will also be used by the patient in an alternate care setting.*
 - IO *Explain barriers to continuity of care between health care organizations.*
 - OBJ R2.10.2 (Application) When given a specialized nutrition support patient who is transitioning from one health care setting to another, communicate pertinent nutrition support information to the receiving health care professionals.
- Goal R2.11 Document direct patient care activities appropriately.
 - OBJ R2.11.1 (Analysis) Appropriately select for documentation direct patient care activities for individuals requiring specialized nutrition support.
 - IO *Explain the organization's policies and procedures for identifying activities that must be documented.*
 - OBJ R2.11.2 (Application) Use effective communication practices when documenting a direct patient-care activity for a patient requiring specialized nutrition support.
 - IO *Explain the organization's policies and procedures for documenting direct patient care activities.*

Outcome R3: Manage and improve the medication-use process affecting patients requiring specialized nutrition support.

Goal R3.1 Prepare and dispense specialized nutrition support formulations and devices using appropriate techniques and following the organization's policies and procedures.

OBJ R3.1.1 (Evaluation) Interpret the appropriateness of a specialized nutrition support order before preparing or permitting distribution of the first formulation.

OBJ R3.1.2 (Application) Prepare specialized nutrition support formulations using appropriate techniques and following the organization's policies and procedures.

IO Explain how to calculate the volume of macronutrient and micronutrient stock solutions to provide a specified amount of the nutrient for the formulation with 100% accuracy.

IO Explain standards of practice for the preparation of specialized nutrition support formulations.

IO Explain the organization's quality assurance standards in the preparation of specialized nutrition support formulations.

IO Compare and contrast quality assurance measures available to assess preparation of specialized nutrition support formulations.

IO Explain how to operate the organization's automated compounders.

IO Compare and contrast the various types of currently available automated compounders used for preparation of parenteral nutrition formulations.

IO Explain the importance of the sequence for component additions, including safety measures.

IO Explain steps in the assessment of specialized nutrition support formulations for appropriate concentrations, rate, compatibilities, stability, and storage.

IO Explain different methods of assessing acceptable calcium/phosphate concentrations in parenteral nutrition formulations.

IO Explain the factors affecting calcium/phosphate solubility in parenteral nutrition formulations.

IO Explain the factors affecting the stability of total nutrient admixtures.

IO Explain factors to consider when adding medications to specialized nutrition support formulations.

OBJ R3.1.3 (Application) Dispense specialized nutrition support formulations following the organization's policies and procedures.

IO Compare and contrast the procedures used to dispense specialized nutrition support formulations in acute and alternate patient care sites.

Goal R3.2 Identify opportunities for improving aspects of the organization's medication-use system that affect individuals requiring specialized nutrition support.

OBJ R3.2.1 (Comprehension) Explain those aspects of the organization's medication-use system affecting individuals requiring specialized nutrition support and its vulnerabilities to adverse drug events (ADEs).

OBJ R3.2.2 (Analysis) Conduct a MUE on an aspect of the medication-use system affecting patients requiring specialized nutrition support.

- OBJ R3.2.3 (Evaluation) Identify opportunities for improvement in the organization's medication-use system that affect individuals requiring specialized nutrition support by comparing the medication-use system to relevant best practices.
- OBJ R3.2.4 (Comprehension) Explain the importance of having organizational policies and procedures to deal with specialized nutrition support products from another source brought into the organization by a patient.
- IO Explain the possible legal implications for the organization of allowing patients to bring into the organization specialized nutrition support products from another source.*
- Goal R3.3 Design and implement quality improvement changes to aspects of the organization's medication-use system affecting individuals requiring specialized nutrition support.
- OBJ R3.3.1 (Synthesis) Design a pilot intervention to change a problematic or potentially problematic aspect of the medication-use system with the objective of improving quality of care for individuals requiring specialized nutrition support.
- Goal R3.4 Participate in the development or maintenance of the organization's formulary for products used in the care of individuals requiring specialized nutrition support.
- OBJ R3.4.1 (Comprehension) Explain a systematic process for developing a formulary for parenteral and enteral products.
- OBJ R3.4.2 (Evaluation) Make a recommendation based on a comparative review for a class decision on a specialized nutrition support product.
- IO Explain the advantages and disadvantages of open or closed delivery systems for enteral nutrition.*
- OBJ R3.4.3 (Synthesis) Formulate effective strategies for communicating formulary restrictions to prescribers.
- IO Explain routes of communication for formulary information on specialized nutrition support products.*
- IO Identify instances when formulary changes should be communicated immediately.*
- OBJ R3.4.4 (Evaluation) When presented with a shortage of a component or product used in specialized nutrition support, identify an appropriate alternative.
- IO State resources for identifying specialized nutrition support components or products in short supply.*
- IO Explain the organization's system for communicating information regarding drug shortages.*
- IO Explain a strategy for making optimal choices for alternative specialized nutrition support components or products.*
- IO Explain patient implications of a vitamin shortage.*
- OBJ R3.4.5 (Evaluation) When the needs of a particular patient warrant, determine if a non-formulary specialized nutrition support component or product should be considered for use.
- IO Identify the appropriate literature that supports the use of a non-formulary specialized nutrition support component in a clinical situation.*
- IO Explain the organization's system for approving, obtaining, and handling non-formulary medications or products used by patients.*



- OBJ R3.4.6 (Synthesis) Contribute to the activities of a committee concerned with specialized nutrition support.
- OBJ R3.4.7 (Evaluation) Make a recommendation based on a comparative review for a decision on a specialized nutrition support device.
- Goal R3.5 Lead the review of existing, or the development and implementation of, clinical pathways and practice guidelines for the care of individuals requiring specialized nutrition support.
 - OBJ R3.5.1 (Analysis) Identify the need for a clinical pathway or practice guideline for use in the care of individuals requiring specialized nutrition support by comparing the applicability of existing guidelines/protocols to the needs of the organization.
 - OBJ R3.5.2 (Synthesis) Develop or modify an existing clinical pathway or practice guideline for use in the care of individuals requiring specialized nutrition support based on best evidence and the characteristics of the local environment and patients.
 - IO Explain factors to consider when tailoring an existing clinical pathway or practice guideline to the needs of one's organization.*
 - OBJ R3.5.3 (Synthesis) Formulate a strategy that will allow for successful implementation of a clinical pathway or practice guideline for the care of individuals requiring specialized nutrition support.
 - IO Explain the importance of using an interdisciplinary approach to implementation of a clinical pathway or guideline.*
 - IO Explain approaches to education of users of a new or modified clinical pathway or guideline.*
 - IO Explain how to identify barriers to implementation of a particular new or modified clinical pathway or guideline.*

Outcome R4: Demonstrate excellence in the provision of training and educational activities for health care professionals in practice or in training and the public.

- Goal R4.1 Provide effective education and training to health care professionals in practice or in training.
 - OBJ R4.1.1 (Synthesis) Use effective educational techniques in the design of an educational/training activity.
 - IO Identify emerging issues in specialized nutrition support practice suitable for interdisciplinary educational sessions.*
 - IO Explain the differences in effective educational strategies and appropriate content when teaching colleagues, residents, students, and health professionals in other disciplines.*
 - IO Explain various methods for incorporating active learning and their limitations.*
 - IO Explain the concept of learning styles and its influence on the design of instruction.*
 - IO Write appropriately worded educational objectives.*
 - IO Explain how different instructional delivery systems (e.g., demonstration, written materials, video) foster different types of learning.*

- IO Explain effective teaching approaches for the various types of learning (e.g., imparting information, teaching psychomotor skills, development of new attitudes).*
- OBJ R4.1.2 (Synthesis) Design an assessment strategy that appropriately measures the specified objectives for education or training and fits the learning situation.
- IO Explain appropriate assessment techniques for assessing the learning outcomes of educational or training programs.*
- OBJ R4.1.3 (Application) Use skill in the four preceptor roles employed in practice-based teaching (direct instruction, modeling, coaching, and facilitation).²
- IO Explain the stages of learning that are associated with each of the preceptor roles.*
- OBJ R4.1.4 (Application) Use public speaking skills to speak effectively to a large group.
- IO Explain techniques that can be used to enhance audience interest.*
- IO Explain techniques that can be used to enhance audience understanding of one's topic.*
- IO Explain speaker habits that distract the audience.*
- OBJ R4.1.5 (Application) Use public speaking skills to speak effectively in a small group.
- Goal R4.2 Create pertinent, evidence-based medication-use information for health care professionals.
- OBJ R4.2.1 (Synthesis) Write an evidence-based medication-use newsletter article or bulletin for health care professionals related to specialized nutrition support using appropriate grammar, punctuation, and style.
- IO Identify specialized nutrition support topics that warrant information distribution.*
- IO Select an appropriate publication format for specialized nutrition support information (e.g., web page, newsletter, correspondence) for health professionals.*
- IO Explain the value of creating polished and professional written and visual materials.*
- Goal R4.3 Design and deliver education programs to the public that center on health improvement, wellness, and prevention of nutritional problems.
- OBJ R4.3.1 (Synthesis) Participate in the design of an educational program for the public that centers on health improvement, wellness, or the prevention of nutritional problems.
- IO Explain appropriate nutrition-related educational topics for health care support groups.*
- IO Explain appropriate nutrition-related educational topics for the public.*

² Nimmo, CM. Developing training materials and programs: creating educational objectives and assessing their attainment. In: Nimmo CM, Guerrero R, Greene SA, Taylor JT, eds. Staff development for pharmacy practice. Bethesda, MD: ASHP; 2000.



OBJ R4.3.2 (Synthesis) Use appropriate educational techniques to deliver an educational program to the public that centers on health improvement, wellness, or prevention of nutritional problems.

Outcome R5: Demonstrate leadership and practice management skills.

Goal R5.1 Exhibit the ongoing development of essential personal skills of a specialized nutrition support pharmacy leader.

OBJ R5.1.1 (Characterization) Practice self-managed continuing professional development with the goal of improving the quality of one's own performance through self-assessment and change.

IO State criteria for judging one's performance of tasks that are critical in one's own practice.

IO Explain the role of participation in local, state, and national nutrition-related and pharmacy professional organization meetings in the ongoing development of expertise in nutrition support pharmacy.

IO Explain the use of professional organizations' learning resources in the development of expertise in nutrition support pharmacy.

IO Explain the role of networking in development of expertise in nutrition support pharmacy.

IO Explain the importance of staying current with pertinent nutrition support literature.

IO Explain the role of board certification in the development of expertise in nutrition support pharmacy.

OBJ R5.1.2 (Characterization) Demonstrate commitment to the professional practice of nutrition support pharmacy through active participation in the activities of local, state, and/or national nutrition-related and pharmacy professional organizations.

IO Assess the relevance of membership or participation in various professional organizations associated with pharmacy and nutrition support pharmacy.

IO Explain the importance of contributing to the work of professional organizations in advancing the visibility of the pharmacist's role in the care of individuals requiring specialized nutrition support.

OBJ R5.1.3 (Synthesis) Devise an effective plan for balancing professional and personal life.

IO Explain the importance of balancing professional and personal life.

IO Explain various approaches advocated for achieving balance in one's life.

OBJ R5.1.4 (Characterization) Display integrity in professional relationships and actions.

IO Explain ethical dilemmas that may confront the nutrition support pharmacy specialist.

IO Explain the system of ethical reasoning employed in arriving at a particular ethical decision.

OBJ R5.1.5 (Application) Adhere to the requirements of the organization's policy in all interactions with the pharmaceutical industry.

- IO *Explain the potential conflicts inherent in the objectives of one's health care organization and the objectives of a pharmaceutical industry representative.*
- OBJ R5.1.6 (Synthesis) Initiate and maintain a systematic approach to documenting professional activities and accomplishments.
- OBJ R5.1.7 (Comprehension) Explain the concept of credentialing as it applies to specialized nutrition support pharmacy practice.
- Goal R5.2 Contribute to the leadership and management activities within the practice area.
 - OBJ R5.2.1 (Application) Use effective negotiation skills to resolve conflicts.
 - OBJ R5.2.2 (Synthesis) Use group participation skills when leading or working as a member of a formal or informal work group.
 - IO *Explain methods for achieving consensus.*
 - IO *Explain how to create an agenda for a meeting.*
 - IO *Explain methods for assuring participation by all members of a group.*
 - IO *Explain methods for effective group leadership.*
 - OBJ R5.2.3 (Comprehension) Explain how to establish a new or enhance an existing nutrition support service.
 - IO *Explain methods for measuring the outcomes of an existing nutrition support service.*
 - IO *Explain approaches, including pharmacoeconomic analysis, to justifying a clinical service.*
 - IO *Explain A.S.P.E.N. guidelines for establishing a nutrition support service.*
 - IO *Compare A.S.P.E.N. standards for pharmacists and non-pharmacists on a nutrition support team.*
 - IO *Explain funding sources for a nutrition support service.*
 - OBJ R5.2.4 (Evaluation) Compare the financial and clinical impact of pharmacy department preparation of specialized nutrition support versus alternative methods of obtaining the product (e.g., outsourcing, pre-mixed).
 - OBJ R5.2.5 (Comprehension) Explain the pros and cons of central versus individual site compounding within an organization.
- Goal R5.4 Exercise practice leadership.
 - OBJ R5.4.1 (Characterization) Demonstrate a commitment to advocacy for the optimal care of patients through the assertive and persuasive presentation of patient care issues to members of the health care team, the patient, and/or the patient's representative(s).
 - OBJ R5.4.2 (Characterization) Display initiative in preventing, identifying, and resolving pharmacy-related patient care problems.
 - OBJ R5.4.3 (Comprehension) Explain the nature of mentoring in pharmacy, its potential connection with achievement, and the importance of being willing to serve as a mentor to appropriate individuals.
 - OBJ R5.4.5 (Comprehension) Explain the general processes of establishing and maintaining a nutrition support pharmacy residency program.
 - OBJ R5.4.6 (Comprehension) Explain elements in the history of nutrition support.

Outcome R6: Contribute to the body of nutrition-related knowledge.

- Goal R6.1 Conduct a nutrition-related research project using effective research and project management skills.
- OBJ R6.1.1 (Synthesis) Identify a topic of significance for a nutrition-related research project that requires institutional review board (IRB) review.
- IO Explain the types of resident projects that will meet residency program project requirements and timeframe.*
 - IO Explain how one determines if a potential project topic is of significance in one's particular practice setting.*
 - IO Explain how to conduct an efficient and effective literature search for a project.*
- OBJ R6.1.2 (Synthesis) Formulate a feasible design for a nutrition-related research project.
- IO Explain the elements of a project proposal.*
 - IO When given a particular approved residency project, explain how to identify those individuals who will be affected by the conduct of the project and strategies for gaining their cooperation.*
 - IO When given a particular approved residency project, explain how to determine a timeline with suitable milestones that will result in project completion by an agreed-upon date.*
- OBJ R6.1.3 (Synthesis) Secure any necessary approvals, including institutional review board (IRB), and any required funding for the proposed nutrition-related research project.
- IO When given a particular proposed residency project, explain how to identify those key stakeholders who must approve that project.*
 - IO Explain the components that make up a budget for a nutrition-related project.*
 - IO Explain the role of the organization's IRB in the approval process of investigations involving human subjects.*
- OBJ R6.1.4 (Synthesis) Conduct a nutrition-related research project as specified in its design.
- IO Explain strategies for keeping one's work on a project at a pace that matches with the timeline plan.*
 - IO When given a particular approved residency project, explain methods for organizing and maintaining project materials and documentation of the project's ongoing implementation.*
- OBJ R6.1.5 (Synthesis) Effectively present the results of a nutrition-related research project.
- OBJ R6.1.6 (Synthesis) Use correct grammar, punctuation, spelling, style, and formatting conventions to prepare a written summary of a nutrition-related research project.
- IO When given a particular residency project ready for presentation, explain the type of manuscript style appropriate to the project and criteria to be met when using that style.*
- Goal R6.2 Conduct effective peer review of materials for publication or presentation.



OBJ R6.2.1 (Evaluation) Participate in the peer review of a nutrition-related article submitted for publication or presentation.

IO Explain the characteristics of an effective peer review.

<p align="center">Elective Educational Outcomes, Goals, and Objectives for Postgraduate Year Two (PGY2) Pharmacy Residencies in Nutrition Support</p>
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Outcome E1: Demonstrate skills required to function in an academic setting.

Goal E1.1 Understand faculty roles and responsibilities.

OBJ E1.1.1 (Comprehension) Explain variations in the expectations of different colleges/schools of pharmacy for teaching, practice, research, and service.

IO Discuss how the different missions of public versus private colleges/schools of pharmacy can impact the role of faculty members.

IO Discuss maintaining a balance between teaching, practice, research and service.

IO Discuss the relationships between scholarly activity and teaching, practice, research and service.

OBJ E1.1.2 (Analysis) Explain the role and influence of faculty in the academic environment.

IO Explain the responsibilities of faculty in governance structure (e.g. the faculty senate, committee service).

IO Describe the responsibilities of faculty (e.g. curriculum development and committee service) related to teaching, practice, research, and service roles.

OBJ E1.1.3 (Comprehension) Describe the academic environment.

IO Describe how the decisions by university and college administration impact the faculty.

IO Discuss outside forces (e.g. change in the profession, funding source, accreditation requirements) that impact administrator and faculty roles.

OBJ E1.1.4 (Comprehension) Describe the types and ranks of faculty appointments.

IO Explain the various types of appointments (e.g. non-tenure, tenure-track, and tenured faculty).

IO Differentiate among the various ranks of faculty (e.g. instructor, assistant professor, associate professor, full professor).

IO Discuss the role and implications of part-time and adjunct faculty as schools continue to expand and faculty shortages occur.

OBJ E1.1.5 (Comprehension) Discuss the promotion and/or tenure process for each type of appointment.

IO Identify the types of activities that are considered in the promotion process.

IO Identify the types of activities that are considered for tenure.

OBJ E1.1.6 (Application) Identify resources available to help develop academic skills.

IO Explain the role of academic-related professional organizations (e.g. AACP) in faculty professional development.

IO Identify resources to help develop teaching skills and a teaching philosophy.

- OBJ E1.1.7 (Comprehension) Explain the characteristics of a typical affiliation agreement between a college of pharmacy and a practice site (e.g., health system, hospital, clinic, retail pharmacy).
- IO Explain how the political environments of either a college or a practice site may affect the other.*
- Goal E1.2 Exercise teaching skills essential to pharmacy faculty.
- OBJ E1.2.1 (Synthesis) Develop an instructional design for a class session, module, or course.
- IO Construct a student-centered syllabus.*
 - IO Construct educational objectives for a class session, module, or course that is appropriate to the audience.*
 - IO Identify appropriate instructional strategies for the class session, module, or course to achieve the objectives.*
 - IO Consider assessment tools that measure student achievement of the educational objectives.*
- OBJ E1.2.2 (Synthesis) Prepare and deliver didactic instruction on a topic relevant to the specialized area of pharmacy residency training.
- IO Identify educational technology that could be used for a class session, module, or course (e.g., streaming media, course management software, audience response systems).*
 - IO Create instructional materials appropriate for the topic and audience.*
 - IO Identify strategies to deal with difficult learners.*
 - IO Given feedback from teaching evaluations (e.g. student and or peer), devise a plan to incorporate improvements in future instruction.*
- OBJ E1.2.3 (Application) Develop and deliver cases for workshops and/or exercises for laboratory experiences.
- IO Identify the appropriate level of case-based teachings for small group instruction.*
 - IO Identify appropriate exercises for laboratory experiences.*
 - IO Provide appropriate and timely feedback to improve performance.*
- OBJ E1.2.4 (Application) Serve as a preceptor or co-preceptor utilizing the four roles employed in practice-based teaching (direct instruction, modeling, coaching and facilitation).
- IO Assess the learner's skill level to determine the appropriate preceptor strategy for providing practice-based teaching.*
 - IO Given performance-based criteria, identify ways to provide constructive feedback to learners.*
 - IO Develop strategies to promote professional behavior.*
 - IO Identify strategies to deal with difficult learners in the practice setting.*
 - IO Given a diverse learner population, identify strategies to interact with all groups with equity and respect.*
- OBJ E1.2.5 (Analysis) Develop a teaching experience for a practice setting (e.g., introductory or advanced pharmacy experience).
- IO Create educational goals and objectives to be achieved.*

- IO* *Develop activities that will allow achievement of identified educational goals and objectives.*
- IO* *Identify how and when feedback should be provided.*
- IO* *Identify other preceptors for the experience, if appropriate.*
- IO* *Determine training that might be needed for the preceptors to deliver student education.*
- IO* *Identify potential challenges of precepting and providing patient care services simultaneously.*
- OBJ E1.2.6 (Synthesis) Design an assessment strategy that appropriately measures the specified educational objectives for the class session, module, course, or rotation.
 - IO* *Identify appropriate techniques for assessing learning outcomes in various educational settings [e.g., written examinations, oral examinations, practical examinations, Objective Structured Clinical Examination (OSCE)].*
 - IO* *Develop examination questions to assess the knowledge, skills, attitudes and behaviors that are appropriate to the learner's level and topic.*
 - IO* *Discuss the various methods for administering examination questions (e.g., computerized testing, paper testing).*
- OBJ E1.2.7 (Evaluation) Create a teaching portfolio.
 - IO* *Define the concept of a teaching portfolio and describe its primary purpose*
 - IO* *Outline the steps in building a teaching portfolio.*
 - IO* *Develop a personal teaching philosophy to guide one's teaching efforts and facilitate student learning.*
- OBJ E1.2.8 (Evaluation) Compare and contrast methods to prevent and respond to academic and profession dishonesty.
 - IO* *Evaluate physical and attitudinal methods to prevent academic dishonesty.*
 - IO* *Discuss methods of responding to incidents of academic dishonesty.*
 - IO* *Discuss the role of academic honor committees in cases of academic dishonesty.*
 - IO* *Identify examples and methods to address unprofessional behavior in learners.*
- OBJ E1.2.9 (Comprehension) Explain the relevance of copyright laws to developing teaching materials.
 - IO* *Discuss copyright regulations as related to reproducing materials for teaching purposes.*
 - IO* *Discuss copyright regulations as related to linking and citing on-line materials.*

Outcome E2: Demonstrate additional skills for contributing to the body of nutrition-related knowledge.

Goal E2.1 Engage in the publication process.

- OBJ E2.1 (Comprehension) Explain the benefits, to the practitioner and the profession, of contributing to the nutrition-related literature.

- OBJ E2.2 (Synthesis) Write a research article, review, or case report related to specialized nutrition support pharmacy that is suitable for publication.
- IO Use a standard style for biomedical journals in the preparation of research articles, reviews, or case reports submitted for publication.*
 - IO Given a specific article, identify appropriate journals to which that article might be submitted for publication.*
 - IO Given an identified topic related to specialized nutrition support, appraise the potential to publish an article on that topic.*
 - IO Explain the rules governing who may declare authorship of a given work.*

- OBJ E2.3 (Application) Follow the submission requirements of an appropriate peer-reviewed publication to submit a research article, review, or case report for publication.

Goal E2.2 Prepare and deliver effective poster presentations.

- OBJ E2.2.1 (Synthesis) Design an effective poster for the presentation of a specific topic.

- IO Explain the types of content that should be included in a poster.*
- IO Explain the rules for visual presentation of poster material.*
- IO Explain resources that can be used to generate poster materials.*

- OBJ E2.2.2 (Synthesis) Exercise skill in responding to questions occurring during the presentation of a poster.

Outcome E.3: Conduct outcomes research.

Goal E3.1 Participate in clinical, humanistic and economic outcomes analyses.

- OBJ E3.1.1 (Evaluation) Contribute to a prospective clinical, humanistic and/or economic outcomes analysis.

- IO Explain the principles and methodology of basic pharmacoeconomic analyses.*
- IO Explain the purpose of a prospective clinical, humanistic or economic outcomes analysis.*
- IO Explain study designs appropriate for a prospective clinical, humanistic and economic outcomes analysis.*
- IO Explain the technique and application of modeling.*
- IO Explain the types of data that must be collected in a prospective clinical, humanistic and economic outcomes analysis.*
- IO Explain possible reliable sources of data for a clinical, humanistic and economic outcomes analysis.*
- IO Explain methods for analyzing data in a prospective clinical, humanistic and economic outcomes analysis.*
- IO Explain how results of a prospective clinical, humanistic and economic outcomes analysis can be applied to internal business decisions and modifications to a customer's formulary or benefit design.*

- OBJ E3.1.2 (Evaluation) Contribute to a retrospective clinical, humanistic, and/or economic outcomes analysis.

- IO Explain the purpose of a retrospective clinical, humanistic or economic outcomes analysis.*



- IO Explain study designs appropriate for a retrospective clinical, humanistic and economic outcomes analysis.*
- IO Explain the types of data that must be collected in a retrospective clinical, humanistic and economic outcomes analysis.*
- IO Explain the content and utilization of reports and audits produced by the pharmacy department.*
- IO Explain possible reliable sources of data for a retrospective clinical, humanistic and economic outcomes analysis.*
- IO Explain methods for analyzing data in a retrospective clinical, humanistic and economic outcomes analysis.*
- IO Explain the impact of limitations of retrospective data on the interpretation of results.*
- IO Explain how results of a retrospective clinical, humanistic and economic outcomes analysis can be applied to internal business decisions and modifications to a customer's formulary or benefit design.*

Outcome E4: Where the nutrition support pharmacy practice is within a setting that allows pharmacist credentialing, successfully apply for credentialing.

Goal E4.1 Successfully petition for credentialing as a nutrition support pharmacy specialist.

OBJ E4.1.1 (Application) Follow established procedures to successfully apply (may be a hypothetical application if not permitted at the site) for credentialing as a nutrition support pharmacy specialist.

- IO Explain the importance of credentialing and how that influences practice.*
- IO State the practice setting's policy for applying to be credentialed as a nutrition support pharmacy specialist.*

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The effective date for implementation of these educational outcomes, goals and objectives is commencing with the entering resident class of 2009.

APPENDIX

Nutrition is rarely the primary problem for patients receiving nutrition support; rather an underlying disease process or condition compromises nutritional status or results in outright nutritional deficiencies. The pharmacy resident in nutrition support must be familiar with the overall treatment plan and coordinate care to assure appropriate pharmacotherapy across the continuum-of-care for the medical and surgical problems, as well as the nutritional issues, of patients receiving enteral and parenteral nutrition support.

A pharmacy residency in nutrition support requires direct patient care experience in diverse patient populations with a variety of disease states and across the full spectrum of disease complexity. Didactic discussions, reading assignments, case presentations, written assignments, and journal club presentations can supplement direct patient care to assure residents understand the scope of issues associated with nutrition support in the multitude of arenas in which this therapy occurs. Programs must offer experiences in both adult and pediatric populations, as well as in different settings (intensive care, acute care, home care), although there may be a focus in one area (e.g., adult acute care).

Pharmacy residents in nutrition support must have an understanding of nutritional requirements and diagnosis of nutritional deficiencies, along with an appreciation for the role of nutrition in the overall management of patients experiencing diseases, therapies, and complications for which patients frequently require specialized nutrition support. Direct patient care experience in at least one age group (neonate, pediatric, adolescent, adult, geriatric) is expected in a majority of the primary categories which follow:

- I. Gastrointestinal Disease
 - A. Short bowel syndrome
 - B. GI motility disorders
 - 1. Pseudo-obstruction
 - 2. Gastroparesis
 - C. Pancreatitis
 - D. Celiac disease
 - E. Small bowel bacterial overgrowth
 - F. Inflammatory bowel disease
 - 1. Crohn's
 - 2. Ulcerative colitis
 - G. Enterocutaneous fistulas
 - H. Chylous leaks
 - 1. Chylothorax
 - 2. Chylous ascites
 - I. Scleroderma

- J. Liver disease
 - 1. Cholestatic liver disease
 - 2. Cirrhosis with acute encephalopathy
 - 3. Cirrhosis without encephalopathy
 - 4. Liver transplant
- K. Pediatric GI disease
 - 1. Prematurity-associated GI dysfunction
 - 2. NEC
 - 3. Atresias of the GI tract
 - 4. Gastroschisis
- II. Gastrointestinal Surgery
 - A. Gastric resections
 - 1. Roux-en-Y
 - 2. Postgastrectomy syndrome
 - 3. Dumping syndrome
 - B. Pancreaticoduodenectomy (Whipple Procedure)
 - C. Bilroth I and II
 - D. Open abdomen
 - E. Intestinal urinary diversions
- III. Hematologic Disease and Cancer
 - A Anemia
 - 1. Nutritional anemias
 - 2. Anemia of chronic disease
 - B. Leukemia
 - C. Hematopoietic (blood and marrow) transplant
 - 1. Graft-versus-host disease (GVHD)
 - 2. Veno-occlusive disease (VOD)
 - D. Head and neck cancers
 - E. Gynecologic cancers
 - F. Cancers of the GI tract
 - G. Chemotherapy-induced complications
 - 1. Tumor lysis syndrome
 - 2. Mucositis
 - 3. Nausea and vomiting
 - H. Radiation therapy complications
- IV. Obesity
 - A. Intestinal bypasses
 - B. Gastric restrictive procedures
 - C. Gastric banding
 - D. Biliopancreatic diversion
 - E. Rouex-en-Y gastric bypass
 - F. Metabolic syndrome
- V. Renal Disease
 - A. Acute renal failure
 - B. Chronic renal failure



- C. Continuous renal replacement therapies (CRRT)
- D. Hemodialysis
- E. Peritoneal dialysis
- F. Intradialytic parenteral nutrition
- G. Nephrotic syndrome
- VI. Neurological Impairment
 - A. Spinal cord injury
 - B. Traumatic brain injury
 - C. Stroke
- VII. Pulmonary Disease
 - A. Acute respiratory distress syndrome (ARDS)
 - B. COPD
 - C. Cystic fibrosis
 - D. ECMO therapy
- VIII. Endocrine Disorders
 - A. Diabetes mellitus
 - B. Hypercalcemia
 - C. Metabolic bone disease
 - D. Syndrome of inappropriate antidiuretic hormone (SIADH)
 - E. Diabetes insipidus
- IX. Acute, Severe Injury
 - A. Burn
 - B. Trauma
- X. Solid Organ Transplant
 - A. Pre-transplant nutritional consequences
 - B. Post-transplant nutritional consequences
 - B. Immunosuppressive regimens for various organs
- XI. Pregnancy
 - A. Normal requirements
 - B. Hyperemesis gravidarum
- XII. Genetic Disorders
 - A. Urea cycle disorders
 - 1. Ornithine transcarbamylase deficiency (OTC)
 - 2. Argininosuccinate synthetase deficiency (AS)
 - 3. Argininosuccinate lyase deficiency (ASL)
 - 4. Arginase deficiency
 - B. Phenylketonuria (PKU)
 - C. Maple syrup urine disease (MSUD)
 - D. Homocystinuria
 - E. Tyrosinemia
 - F. Galactosemia

XIII. Failure to Thrive

A. Cachexia

1. Cancer-related
2. Cardiac-related
3. Pulmonary-related
4. Other diseases

B. Pediatric

The pharmacy resident in nutrition support must be familiar with prevention, diagnosis, and treatment of complications associated with enteral and parenteral nutrition support. Direct patient care experience with most of the listed complications is expected during pharmacy residency training in nutrition support.

- i. Hyperglycemia
- ii. Hypertriglyceridemia
- iii. Hepatobiliary complications
- iv. Diarrhea
- v. Constipation
- vi. Electrolyte disorders
- vii. Overfeeding
- viii. Aluminum toxicity
- ix. Refeeding syndrome
- x. Metabolic bone disease
- xi. Central line infections
- xii. Central line occlusions
- xiii. Acid-base disorders
- xiv. Aspiration
- xv. Gastric residual volume
- xvi. Steatorrhea
- xvii. Nausea and vomiting
- xviii. Clogging of enteral feeding tubes
- xix. 3-in-one (TNA) stability issues
- xx. Delayed wound healing
- xxi. Prerenal azotemia
- xxii. Essential fatty acid deficiency (EFAD)
- xxiii. Drug-nutrient interactions
- xxiv. Calcium-phosphate solubility issues
- xxv. Carnitine deficiency
- xxvi. Micronutrient deficiency