

<p><b>Required Educational Outcomes, Goals, and Objectives for Postgraduate Year Two (PGY2) Pharmacy Residencies in Solid Organ Transplant</b></p>
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### **Overview of PGY2 Solid Organ Transplant Pharmacy Residencies**

PGY2 pharmacy residencies in solid organ transplant are designed to transition PGY1 residency graduates from generalist practice to specialized practice focused on the care of solid organ transplant recipients and, in some instances, living organ donors. Residency graduates are equipped to participate as essential members of interdisciplinary teams caring for transplant patients, assuming responsibility for the medication-related aspects of care. Team involvement includes contributing the pharmacy perspective to selection and preparation of recipients. Transplant residency graduates are proficient in the care of patients as they prepare to receive a transplant, during the acute care phase of transplantation, and in the ongoing primary care role after transplant as the pharmacist works with the patient to sustain the survival of the transplanted organ, manage diseases that occur or reoccur post transplant, and enhance the patient's general health and wellness.

In addition to these direct patient care responsibilities, transplant residency graduates are trained to serve as authoritative resources in their health systems for the optimal use of medications in transplant recipients. In that role, they can be relied upon to lead the development and implementation of medication-related guidelines and protocols for transplant patient care, meet the health system's needs for transplant-related drug information, and provide the transplant pharmacy perspective to organizations making technology and automation decisions. Graduates are also highly skilled in the design and delivery of education and training related to transplantation for a wide spectrum of potential audiences, including the patient and/or caregiver as well as health care professionals in practice or in training.

Because transplantation is such a rapidly developing field, graduates of solid organ transplant pharmacy residencies are all skilled in supporting or conducting transplant research and in outcomes analyses.

## **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.<sup>1</sup>

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.

The educational outcomes, goals, and objectives are divided into those that are required and those that are elective. Required outcomes, including all of the goals and objectives falling under them, must be included in the design of all programs. 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.

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<sup>1</sup> 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.

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***Outcome R1: Serve as an authoritative resource on the optimal use of medications in recipients of a solid organ transplant.***

Goal R1.1 Establish oneself as an expert for transplant pharmacy-related information and resources.

OBJ R1.1.1 (Synthesis) Develop a strategy for earning credibility within the organization to be an authoritative resource on the pharmaceutical care of transplant patients.

*IO Identify barriers to the transplant pharmacist for earning credibility with members of the transplant team.*

*IO Identify barriers to the transplant pharmacist for earning credibility within the organization.*

Goal R1.2 Lead the modification or development and implementation of medication-related guidelines or protocols for transplant patient care.

OBJ R1.2.1 (Analysis) Identify the need for a new or modified medication-related guideline/protocol for transplant patient care.

OBJ R1.2.2 (Synthesis) Modify or develop a medication-related guideline/protocol for transplant patient care based on best evidence and analyses of the organization's transplant patient data.

OBJ R1.2.3 (Synthesis) Formulate a strategy to successfully implement a medication-related guideline/protocol for transplant patient care.

OBJ R1.2.4 (Evaluation) Assess the results of implementing a medication-related guideline/protocol for transplant patient care.

*IO Explain how a medication-use evaluation can be utilized to measure the effects of implementing a guideline/protocol on clinical processes or outcomes.*

*IO Explain how a medication-use evaluation can be utilized to measure adherence to a guideline/protocol.*

Goal R1.3 Provide concise, applicable, comprehensive, and timely responses to formal or informal drug information requests pertaining to the care of transplant patients.

OBJ R1.3.1 (Analysis) Discriminate between the requester's statement of need and the actual drug information need by clarifying any additional and appropriate defining questions.

OBJ R1.3.2 (Synthesis) Formulate a systematic, efficient, and thorough procedure for retrieving drug information.

*IO Identify various sources of transplant-related biomedical literature and the nature and caliber of information each is likely to provide.*

*IO Explain the potential need for increased reliance on alternate sources (e.g., abstracts from national meeting presentations, industry-authored medical information responses, expert opinion, clinical practice guidelines, transplant registries or databases) when researching transplant-related medication questions.*

- OBJ R1.3.3 (Analysis) Determine from all retrieved biomedical literature the appropriate information to evaluate.
- OBJ R1.3.4 (Evaluation) Evaluate the usefulness of biomedical literature gathered.
- OBJ R1.3.5 (Evaluation) Determine whether a study's conclusions are supported by the study results.
- OBJ R1.3.6 (Synthesis) Formulate responses to formal drug information requests based on analysis of the literature.
- OBJ R1.3.7 (Synthesis) Provide appropriate responses to informal drug information questions that require the pharmacist to draw upon his or her knowledge base.
- OBJ R1.3.8 (Evaluation) Assess the effectiveness of drug information recommendations.
  - IO Explain all factors that must be assessed to determine the effectiveness of a response.*
- Goal R1.4 Develop a core library appropriate for transplant pharmacy practice.
  - OBJ R1.4.1 (Application) Use a knowledge of standard transplant-related resources to develop and maintain a core library of primary, secondary, and tertiary references appropriate for transplant pharmacy practice, education, and research.
    - IO Explain how to access and withdraw information from national transplant databases (e.g., The United Network for Organ Sharing).*
- Goal R1.5 Contribute the transplant pharmacy perspective to the organization's technology and automation systems decisions.
  - OBJ R1.5.1 (Synthesis) When appropriate, contribute to the organization's design of its technology and automation systems.
    - IO Explain the transplant pharmacist's potential contributions to the design of technology (e.g., CPOE, databases, pharmacy systems, PDAs) for the organization.*
    - IO Explain the transplant pharmacist's potential role in contributing to decisions regarding automation.*
- Goal R1.6 Contribute to clinical, humanistic and/or economic transplant outcomes research.
  - OBJ R1.6.1 (Evaluation) Contribute to a prospective or retrospective clinical, humanistic and/or economic outcomes analysis.
    - IO Explain the purposes of prospective and of retrospective clinical, humanistic and economic outcomes analyses.*
    - IO Explain the principles and methodology of basic outcomes analyses.*
    - IO Explain study designs appropriate for prospective and for retrospective clinical, humanistic and economic outcomes analyses.*
    - IO Explain the types of data that must be collected in prospective and in retrospective clinical, humanistic and economic outcomes analyses.*
    - IO Explain possible reliable sources of data for clinical, humanistic and economic outcomes analyses.*
    - IO Explain methods for analyzing data in prospective and in retrospective clinical, humanistic and economic outcomes analyses.*
    - IO Explain the impact of limitations of retrospective data on the interpretation of results.*

- IO Explain how results of prospective and of retrospective clinical, humanistic and economic outcomes analyses can be applied to clinical practice decisions.*
- IO Explain the regulatory process when trying to implement prospective or retrospective clinical, humanistic, and economic outcomes analyses.*

**Outcome R2: Optimize the outcomes of transplant patients by promoting and/or providing evidence-based medication therapy as an integral member of an interdisciplinary team in acute and ambulatory care settings.**

*(In those settings where the transplant pharmacist provides care to both the transplant recipient and a living donor, the following educational goals and objectives also apply to the care of the living donor.)*



- Goal R2.1 Establish collaborative professional relationships with members of interdisciplinary health care teams involved in the care of transplant patients.
- OBJ R2.1.1 (Synthesis) Implement a strategy that effectively establishes cooperative, collaborative, and communicative working relationships with members of the interdisciplinary health care team involved in the care of a transplant patient.
- IO Explain the training and expected areas of expertise of the members of the interdisciplinary transplant team with which one works.*

- IO For each of the professions with which one interacts on the interdisciplinary transplant team, explain the profession's view of its role and responsibilities in collaborations on patient-centered care.*
  - IO Explain the expectations of the pharmacist's role on the transplant team from the viewpoint of different collaborating professions.*
  - IO Explain the professional dynamics of the different services that contribute to the care of transplant patients.*
  - IO Identify the interpersonal dynamics of each member of the transplant team.*
- Goal R2.2 Contribute to the pre-transplant evaluation of transplant candidates.
- OBJ R2.2.1 (Evaluation) Contribute the pharmacy perspective to the selection process and listing of transplant patients.
    - IO Explain factors to consider when determining those patients who are medically, surgically, and socially suitable for transplantation.*
    - IO Explain factors to consider when determining the most appropriate immunosuppressive/immunomodulatory approach for a given transplant recipient-donor combination (living or cadaveric).*
- Goal R2.3 Prioritize the pharmaceutical care needs of transplant patients.
- OBJ R2.3.1 (Synthesis) Devise a strategy for prioritizing pharmaceutical care activities given practical time constraints and multiple practice responsibilities.
    - IO Explain factors to consider when determining priorities of care among transplant patients.*
    - IO Explain how priorities of pharmaceutical care may be mandated or influenced by the complexity or urgency of a given transplant patient's problems.*
    - IO Explain the importance to transplant pharmacy practitioners of maintaining proficiency in the management of general medical problems in immunocompromised patients.*
- Goal R2.4 Establish collaborative relationships between the pharmacist and transplant patients and/or caregivers.
- OBJ R2.4.1 (Synthesis) Formulate a strategy that effectively establishes a patient-centered relationship between the pharmacist and transplant patient and/or caregiver.
    - IO Explain unique characteristics of transplant patients that may influence the pharmacist-patient relationship.*
    - IO Explain social and pharmacoeconomic issues encountered frequently in transplant recipients.*
    - IO Explain how pharmacist-patient interactions may differ when the organ is from a living donor versus when the organ is from a deceased donor.*
- Goal R2.5 Collect and analyze patient information.
- OBJ R2.5.1 (Analysis) Collect and organize all patient-specific information needed by the transplant pharmacist to anticipate, prevent, detect, and/or resolve medication-related problems and to make appropriate evidence-based, patient-centered therapeutic recommendations as part of the interdisciplinary transplant team.

- IO Explain the types of information that are typically available regarding a transplant patient and donor, prior to direct pharmacist-patient involvement.*
  - IO Identify the types of patient-specific information, including complementary and alternative medicines, the pharmacist requires to anticipate, prevent, detect, and/or resolve medication-related problems and to make appropriate evidence-based, patient-centered medication therapy recommendations for transplant patients.*
  - IO Explain the functions of the immune system and how they relate to transplantation and design of immunosuppressive therapies.*
  - IO Explain how to interpret and apply the various diagnostic and laboratory tests commonly performed in transplant patients.*
  - IO Explain pharmacokinetic and pharmacodynamic alterations that occur between pre- and post-transplantation, and how these might influence drug dosing strategies for transplant patients.*
  - IO Explain the signs and symptoms, epidemiology, etiology, risk factors, pathogenesis, natural history, pathophysiology, clinical course, prevention, and pre-transplant management of diseases or conditions that frequently underlie an indication for transplantation as listed in the appendix.*
  - IO Explain the management of end-stage organ disease in recipients awaiting transplant.*
  - IO Explain signs and symptoms, epidemiology, etiology, risk factors, pathogenesis, natural history, pathophysiology, clinical course, prevention, and treatment of diseases or conditions that frequently occur or reoccur after transplantation as listed in the appendix.*
  - IO Explain signs and symptoms, epidemiology, etiology, risk factors, pathogenesis, pathophysiology, clinical course, prevention, and treatment of the types of rejection that may occur after transplantation as listed in the appendix.*
  - IO Explain the mechanism of action, pharmacokinetics, pharmacodynamics, pharmacogenomics, pharmacoeconomics, usual regimen (dose, schedule, form, route, and method of administration), indications, contraindications, interactions, adverse reactions, and therapeutics of immunosuppressive agents.*
  - IO Explain transplant-specific or unique mechanisms of action, pharmacokinetics, pharmacodynamics, pharmacogenomics, pharmacoeconomics, usual regimen (dose, schedule, form, route, and method of administration), indications, contraindications, interactions, adverse reactions, and therapeutics of medications used to prevent and treat diseases commonly occurring in transplant recipients.*
- OBJ R2.5.2 (Analysis) Determine the presence of any of the following medication therapy problems in a transplant recipient's or living organ donor's current medication therapy:
1. Medication used without medical indication

2. Medical conditions for which medication therapy is warranted but not prescribed
3. Inappropriate medication selection for a given medical condition
4. Immunization regimen is incomplete or inappropriate
5. Current medication therapy regimen contains something inappropriate (dose, dosage form, duration, schedule, route of administration, method of administration)
6. Unnecessary therapeutic duplication
7. Medication to which the patient is allergic has been prescribed
8. Adverse drug- or device-related events are highly suspected, or potential for such events is detected
9. Clinically significant drug-drug, drug-disease, drug-nutrient, or drug-laboratory test interactions or potential for such interactions
10. Medical therapy has been compromised by social, recreational, nonprescription, complementary, or alternative drug use by the patient
11. Patient not receiving full benefit of prescribed medication therapy
12. Problems arising from the financial impact of medication therapy on the patient
13. Patient lacks understanding of medication therapy
14. Patient not adhering to medication regimen

*IO Explain why the transplant pharmacist needs to anticipate therapeutic dilemmas and formulate appropriate alternatives.*

*IO Explain the potential impact of transplant-related medication side effects, costs, and scheduling on the adherence and persistence of transplant patients.*

*IO Explain how optimization of pre-transplant therapies may impact post-transplantation outcomes.*

*IO Describe common long-term post-transplant complications and their implication(s) regarding indication for initiation or modification of therapy.*

OBJ R2.5.3 (Analysis) Using an organized collection of patient-specific information, summarize the transplant patient's health care needs.

Goal R2.6 Identify patients in need of a referral or consult.

OBJ R2.6.1 (Evaluation) When presented with a transplant patient with health care needs that cannot be met by the transplant interdisciplinary team, contribute to the team's decision to make a referral or request a consult.

*IO Explain the role of non-pharmacologic approaches in addressing post-transplant complications or patient care needs.*

Goal R2.7 Design evidence-based therapeutic regimens for transplant patients.

OBJ R2.7.1 (Synthesis) Specify therapeutic goals for a transplant patient incorporating the principles of evidence-based medicine that integrate patient-specific data, center-specific experience, disease and medication-specific information, ethics, and quality-of-life considerations.

*IO Explain various genetic, race, gender-related, age-related, and disease-related factors that influence the establishment of therapeutic goals and their achievement in transplant patients.*



OBJ R2.7.2 (Synthesis) Design a patient-centered regimen that meets the evidence-based therapeutic goals established for a transplant patient; integrates patient-specific, disease, and medication information; ethical and quality-of-life issues; and considers pharmacoeconomic principles.

*IO Identify various sources of disease management and drug-use guidelines potentially applicable to transplant populations.*

*IO Explain how to assess a transplant candidate's immunologic risk and how it would influence the patient's medication regimen.*

*IO Evaluate organization-specific protocols or patient management strategies versus external guidelines and reported experience when deciding which to use with a specific patient.*

*IO Explain the rationale underlying various immunosuppressive strategies utilized in transplant patients.*

*IO Explain screening approaches for identification of transplant patients eligible for research protocols based on protocol inclusion and exclusion criteria.*

*IO Explain additional concerns with adherence/persistence and cost when designing or implementing medication regimens for transplant patients.*

*IO Explain various payer mechanisms for coverage of transplant-related medications, particularly the interplay between Medicare, Medicaid, commercial insurers, and medication assistance programs.*

*IO Explain medication therapy considerations for those who have served as living organ donors.*

Goal R2.8 Design evidence-based monitoring plans for management of transplant patients.

OBJ R2.8.1 (Synthesis) Design a patient-centered, evidence-based monitoring plan for a medication regimen that effectively evaluates achievement of transplant patient-specific goals.

*IO State customary monitoring parameters for medication regimens commonly prescribed for transplant patients that assess for safety and efficacy.*

*IO Explain the effect of transplant-related medication therapies on the interpretation of clinical parameters.*

*IO Explain various approaches to assessing immunologic response to medication therapy (e.g., therapeutic drug monitoring, functional immunologic assays, biopsies, clinical complications [i.e., certain viral infections]).*

OBJ R2.8.2 (Synthesis) Design a patient-centered, evidence-based monitoring plan for non-pharmacologic therapy that effectively evaluates achievement of transplant patient-specific goals.

*IO Describe the relative role of surgical or non-pharmacologic interventions in managing post-transplant complications.*

*IO Describe the implications of surgical or technical complications of transplant upon the pharmacologic plan of therapy.*

Goal R2.9 Communicate medication regimen recommendations and monitoring plans for transplant patients to relevant persons.

- OBJ R2.9.1 (Application) Communicate recommendations for a patient-centered, evidence-based therapeutic regimen and corresponding monitoring plan to other members of the interdisciplinary team in a manner that is systematic, logical, accurate, timely, system-appropriate, and secures consensus from the team.
- OBJ R2.9.2 (Application) Communicate recommendations for a patient-centered, evidence-based therapeutic regimen and corresponding monitoring plan to the transplant patient in a way that is sensitive, accurate, matched to the patient's level of comprehension, and fosters adherence and persistence by the patient and/or caregiver.
- IO Explain the kinds of issues that require particular sensitivity when discussing medication treatment plans with transplant patients and/or caregivers.*
- IO Explain to the patient and/or caregiver the special obligations (or monitoring requirements) of patients participating in research protocols and the rights of patients to withdraw from protocols.*
- Goal R2.10 Implement regimens and monitoring plans.
- OBJ R2.10.1 (Application) When appropriate, initiate the patient-centered, evidence-based therapeutic regimen and monitoring plan for a transplant patient according to the organization's policies and procedures for pharmacist or research-related privileging.
- IO Explain the organization's policies and procedures for ordering diagnostic or monitoring tests.*
- IO Explain the organization's policies and procedures for issuing medication orders.*
- OBJ R2.10.2 (Application) When necessary, contribute to the work of the team to facilitate patient access to necessary medications.
- IO Explain the general framework of patient assistance programs available for transplant-related drugs.*
- IO Explain the pharmacist's role relative to other interdisciplinary team members in securing payer coverage or patient assistance for transplant-related drugs, within the context of the training program.*
- IO Explain circumstances in which it may be appropriate to redesign a patient's medication regimen in order to ensure that a patient will have financially viable access to the prescribed medications.*
- IO Explain various approaches used to adjust medication regimens in order to facilitate patient access to medications.*
- OBJ R2.10.3 (Application) Use effective patient education techniques to provide counseling to transplant patients and caregivers, including information on medication therapy, interactions, adverse effects, adherence, persistence, appropriate use, handling, storage, and medication administration.
- IO Explain the imperative that patients learn they must check with the transplant team before adding any prescribed, OTC, or alternative medication to their regimen.*
- IO Explain the critical role of adherence and persistence in the short and long-term success of transplantations.*

- IO Explain potential strategies for educating patients who present educational challenges (e.g., language barriers, blind, deaf, illiterate, immature).*
- Goal R2.11 Evaluate transplant patients' progress and redesign medication regimens and monitoring plans as indicated by their clinical course.
- OBJ R2.11.1 (Evaluation) Accurately assess the transplant patient's progress toward short and long-term therapeutic goals.
- IO Explain potential long-term complications in transplant recipients and the importance of monitoring for such complications.*
- IO Explain the interplay between management of short-term post-transplant complications and potential implications for longer-term management goals or approaches.*
- IO Explain the role of the pharmacist in ongoing management of transplant patients for maximizing survival of a transplanted organ and its recipient.*
- IO Explain the transplant organization's systematic plan for routine patient follow-up and monitoring.*
- IO Assess the need of an individual patient to modify the organization's routine approach to patient follow-up and monitoring.*
- OBJ R2.11.2 (Synthesis) Based on evaluation of monitoring data, therapeutic outcomes, and the evolution of standards of care within transplantation, redesign a transplant patient's medication regimen and monitoring plan as necessary.
- IO Explain the impact of evolving transplant research and its potential application to ongoing therapy of transplant recipients.*
- Goal R2.12 Communicate ongoing patient information to relevant persons.
- OBJ R2.12.1 (Application) Ensure that accurate and timely information regarding a specific transplant patient reaches those who need it at the appropriate time, according to the organization's established or innovative approaches.
- IO Explain how to recognize instances in which there is urgency in communicating the results of monitoring to the appropriate members of the transplant team.*
- OBJ R2.12.2 (Application) When given a transplant patient who is transitioning from one health care setting to another, facilitate continuity of care by communicating pertinent patient information to the receiving health care professionals.
- IO Explain what information will be critical to ongoing implementation or monitoring of a specific plan of pharmaceutical care.*
- IO Explain how to identify the key recipients of critical information and the most effective means of communicating such information for a given care setting.*
- Goal R2.13 Document direct patient care activities appropriately.
- OBJ R2.13.1 (Analysis) Select for documentation the appropriate direct patient-care activities for transplant patients.
- OBJ R2.13.2 (Application) Use effective communication practices when documenting a direct patient-care activity for a transplant patient.

***Outcome R3: Manage and improve the medication-use process in transplant patient care areas.***

- Goal R3.1 Serve as an organizational resource for knowledge about the proper preparation, distribution, and administration of transplant-related medications.
- OBJ R3.1.1 (Comprehension) Explain aspects of the preparation, distribution, and administration of medications unique to transplantation.
- Goal R3.2 Identify potential opportunities for improvement relating to aspects of the organization's medication-use system affecting transplant patients.
- OBJ R3.2.1 (Comprehension) Explain those aspects of the organization's medication-use system affecting transplant patients and any vulnerabilities to adverse drug events (ADEs).
  - OBJ R3.2.2 (Analysis) Analyze the structure and process of the medication-use system and, when called for, measure outcomes in the transplant environment.
  - OBJ R3.2.3 (Evaluation) Identify opportunities for improvement in aspects of the organization's medication-use system affecting transplant patients by comparing the medication-use system to relevant best practices.
  - OBJ R3.2.4 (Application) Participate in the organization's system for reporting medication errors and adverse drug reactions.

***Outcome R4: Demonstrate leadership and practice management skills.***

- Goal R4.1 Exhibit the ongoing development of essential personal skills of a practice leader.
- OBJ R4.1.1 (Characterization) Practice self-managed continuing professional development with the goal of improving the quality of one's own performance through self-assessment and personal 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 transplant and pharmacy professional organization meetings in the ongoing development of expertise in transplantation.*
  - OBJ R4.1.2 (Characterization) Demonstrate commitment to the professional practice of transplant pharmacy through active participation in the activities of local, state, and/or national transplant and pharmacy professional organizations.
    - IO Assess the relevance of membership or participation in various professional associations associated with transplant or pharmacy practice.*
    - IO Explain the importance of contributing to the work of transplant professional organizations in advancing the visibility of the pharmacist's role in transplantation.*
  - OBJ R4.1.3 (Characterization) Demonstrate the ability to make rational but rapid decisions in intense situations where time is at a minimum.
  - OBJ R4.1.4 (Organization) Demonstrate sensitivity to the perspective of the patient, caregiver, or health care colleague in all communications.
    - IO Explain the importance of adjusting one's communications according to the level of health literacy of the patient.*
    - IO Explain common situations in the practice of transplant pharmacy which can present challenges to effective communication.*

- IO Explain potential communication strategies that could be used to overcome difficulties in communication, including the use of active listening.*
- IO Explain the meaning of cultural competence in health care practice.*
- IO Explain communication strategies that are appropriate for patients who are non-English speakers or who are impaired.*
- IO Explain the importance of adjusting one's communications for different types of health professionals (e.g., nurses, physicians, respiratory therapist).*
- OBJ R4.1.5 (Characterization) Demonstrate enthusiasm and passion for the profession of transplant pharmacy.
  - IO Explain the roles of transplant pharmacists in various practice areas including clinical practice, academia, and industry (e.g., medical science liaison, clinical research scientist, study coordinator).*
- Goal R4.2 Contribute to the leadership and management activities within the transplant pharmacy practice area.
  - OBJ R4.2.1 (Application) Use effective negotiation skills to resolve conflicts.
  - OBJ R4.2.2 (Synthesis) Use group participation skills when leading or working as a member of a formal or informal work group.
- Goal R4.3 Exercise practice leadership.
  - OBJ R4.3.1 (Characterization) Demonstrate a commitment to advocacy for the optimal care of transplant 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 R4.3.2 (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 R4.3.3 (Comprehension) Explain the general processes of establishing and maintaining a transplant pharmacy residency program.
  - OBJ R4.3.4 (Comprehension) Explain the potential benefits, to the practitioner and the profession, of contributing to the transplant literature.
  - OBJ R4.3.5 (Characterization) Demonstrate a caring attitude toward transplant patients and their representative(s).
    - IO Explain potential emotional issues surrounding both donation of an organ and receipt of an organ from a living or deceased donor.*
    - IO Explain initiatives to increase organ donation awareness and potential means of supporting such efforts on a personal or professional basis.*
  - OBJ R4.3.6 (Synthesis) Promote health improvement and wellness of the transplant patient.

***Outcome R5: Demonstrate excellence in the provision of training or educational activities about transplant-related medications for health care professionals and health care professionals in training.***

- Goal R5.1 Provide effective education or training about transplant-related medications to health care professionals and those in training.

- OBJ R5.1.1 (Application) Use effective educational techniques in the design of all educational activities.
- IO Identify issues in transplant pharmacy practice that would be suitable for interdisciplinary educational sessions.*
  - IO Explain the differences in effective educational strategies when teaching colleagues versus residents versus students versus health professionals in other disciplines.*
  - IO Design instruction that meets the individual learner's needs.*
    - IO Explain the concept of learning styles and its influence on the design of instruction.*
  - IO Construct appropriately worded educational objectives.*
  - IO Explain the match between instructional delivery systems (e.g., demonstration, written materials, videotapes) and the specific types of learning each facilitates.*
  - IO Design instruction that utilizes strategies, methods, and techniques congruent with the objectives for education or training.*
    - IO Explain effective teaching approaches for the various types of learning (e.g., imparting information, teaching psychomotor skills, inculcation of new attitudes).*
- OBJ R5.1.2 (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 R5.1.3 (Application) Use skill in the four preceptor roles employed in practice-based teaching (direct instruction, modeling, coaching, and facilitation).
- IO Explain the stages of learning that are associated with each of the preceptor roles.*
- OBJ R5.1.4 (Application) Use skill in case-based teaching.
- IO Explain the importance of identifying key teaching points for a case before attempting to construct it.*
  - IO Explain factors to consider when selecting which patient data to present in a case*
- OBJ R5.1.5 (Application) Use public speaking skills to speak effectively in large group situations.
- 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 R5.1.6 (Application) Use public speaking skills to speak effectively in small group situations.

**Outcome R6: Conduct transplant research.**

Goal R6.1 Conduct a transplant research project using effective project management skills.

- OBJ R6.1.1 (Synthesis) Identify a topic of significance for a transplant research project.

- IO Explain the types of research projects (e.g., prospective, retrospective, clinical trials) that will meet residency program project requirements and timeframe.*
- IO Explain factors to consider in assessing the relevance or significance of a potential project idea to a particular practice setting.*
- IO Explain how to conduct an efficient and effective background literature search for a project.*
- IO Explain how to generate a research question(s) to be answered by an investigation.*
- OBJ R6.1.2 (Synthesis) Formulate a feasible design for a transplant research project.
  - IO Explain the elements of a project proposal.*
  - IO Explain how to identify those individuals who will be affected by the conduct of the project and strategies for gaining their cooperation.*
  - IO Explain how to determine a timeline with suitable milestones that will result in project completion by an established target date.*
  - IO Explain the ethics of research on human subjects and the role of the IRB in monitoring research.*
  - IO Explain various methods for constructing data collection tools.*
- OBJ R6.1.3 (Synthesis) Secure any necessary approvals, including IRB and funding, for one's design of a project.
  - IO Explain how to identify those key stakeholders who must approve a particular project.*
  - IO Explain the components that make up a budget for various types of research projects.*
  - IO Explain the role of the organization's IRB in the approval process.*
- OBJ R6.1.4 (Synthesis) Implement a transplant 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 projected timeline.*
  - IO When given a particular approved residency project, explain methods for organizing and maintaining project materials and documentation of the project's ongoing implementation.*
  - IO Explain methods for data analysis.*
- OBJ R6.1.5 (Synthesis) Effectively present the results of a transplant research project at a meeting outside of the organization.
  - IO Explain the process of submitting a research abstract for presentation at an appropriate pharmacy or transplant association meeting.*
- OBJ R6.1.6 (Synthesis) Successfully utilize accepted manuscript style to prepare a final report of a transplant 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.*
- OBJ R6.1.7 (Evaluation) Accurately assess the impact, including sustainability if applicable, of the residency project.

<p style="text-align: center;"><b>Elective Educational Outcomes, Goals, and Objectives for Postgraduate Year Two (PGY2) Pharmacy Residencies in Solid Organ Transplant</b></p>
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***Outcome E1: Demonstrate additional leadership and practice management skills.***

- Goal E1.1 Develop a proposal for a new or revised transplant-related pharmacy service.
- OBJ E1.1.1 (Synthesis) Write a proposal for a transplant-related service that meets a perceived need of the organization and its patients.
    - IO Explain the effect of resource limitations on realistic designs for new or improved transplant-related pharmacy services.*
  - OBJ E1.1.2 (Application) Use effective presentation skills to present a proposal for a new or revised transplant-related service to the various concerned entities within the organization.
  - OBJ E1.1.3 (Evaluation) Utilize effective strategies for implementing a new or revised transplant-related pharmacy service.
  - OBJ E1.1.4 (Evaluation) Appraise a new or revised transplant pharmacy service for adequacy in meeting the stated goals.

***Outcome E2: Contribute to formulary decisions regarding transplant-related medications.***

- Goal E2.1 Contribute to the organization's formulary decision-making process for transplant-related medications.
- OBJ E2.1.1 (Evaluation) Make recommendations for additions or deletions to the organization's formulary for a transplant-related medication based on literature, organizational protocols, and/or comparative reviews.
    - IO Explain off-label usage patterns of transplant medications and their potential impact on formularies and medication-use policies.*
    - IO State the elements of a comparative formulary review including consideration of efficacy, safety, and cost.*
    - IO State key sources to consult, including prescribers, in the preparation of a comparative review and recommendation(s) for a given organization.*
    - IO Explain the importance of including consideration of efficacy, safety, and cost in the preparation of reviews.*
  - OBJ E2.1.2 (Synthesis) Formulate effective strategies for communicating formulary restrictions to providers.
    - IO Explain routes of communication of formulary information within the organization and any peculiarities in the transplant setting.*
    - IO Identify instances when formulary changes should be communicated immediately.*
  - OBJ E2.1.3 (Evaluation) When presented with a real or hypothetical drug shortage, identify appropriate alternative medications.
    - IO State resources for identifying medications 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 medications.*
    - IO Explain strategies for allocating existing supplies of a drug in short supply.*



***Outcome E3: Demonstrate additional skills for managing and improving the medication-use process in transplant patient care areas.***

- Goal E3.1 Prepare and dispense medications for transplant patients following existing standards of practice and the organization's policies and procedures.
- OBJ E3.1.1 (Evaluation) Interpret the appropriateness of a transplant-related medication order before preparing or permitting the distribution of the first dose.
  - OBJ E3.1.2 (Application) Follow the organization's policies and procedures to maintain the accuracy of the patient's medication profile.
  - OBJ E3.1.3 (Application) Prepare transplant-related medications following appropriate standards of practice and the organization's policies and procedures.
  - OBJ E3.1.4 (Application) Dispense transplant-related medications following the organization's policies and procedures.
- Goal E3.2 Design and implement quality improvement changes to aspects of the organization's medication-use system affecting transplant patients.
- OBJ E3.2.1 (Synthesis) Contribute to the design and implementation of pilot interventions to change problematic or potentially problematic aspects of the medication-use system with the objective of improving quality of care for transplant patients.

***Outcome E4: Publish on transplant-related topics.***

- Goal E4.1 Write for publication pertinent medication-use information on transplant-related topics for health care professionals and/or the public.
- OBJ E4.1.1 (Synthesis) Use a knowledge of the purpose of a particular publication to write pertinent transplant-related information for health care professionals and/or the public.
    - IO (Analysis) Identify transplant-related topics that would be suitable for a particular audience.*
  - OBJ E4.1.2 (Synthesis) Submit a suitably formatted article on a transplant-related topic for peer-reviewed publication.
  - OBJ E4.1.3 (Evaluation) Provide peer review of a pharmacy or transplant-related article for a publication.

***Outcome E5: Function effectively in transplant settings participating in clinical investigations.***

- Goal E5.1 Contribute to the operation of a system that prepares and distributes investigational transplant-related medications.
- OBJ E5.1.1 (Evaluation) Evaluate relevant aspects of a transplant-related investigational drug study.
    - IO Explain factors to consider (e.g., impact on pharmacy budget, personnel) when determining the feasibility of a proposed transplant-related investigational drug study.*
    - IO Explain drug procurement, storage, preparation, administration, and accountability considerations for investigational or other research-related drugs.*

- IO Explain the phases of the investigational drug development process and the objectives for each phase as it applies to gaining FDA approval of transplant-related drugs.*
- IO Explain the steps in the investigational drug protocol approval process.*
- IO Explain the purposes of standard sections of investigational protocols for transplant-related therapy.*
- IO Explain factors to consider when judging the adequacy of the informed consent document.*
- IO Explain the laws and regulations governing informed consent (and, in pediatric patients, assent) and conduct of clinical research.*
- OBJ E5.1.2 (Application) Manage the use of transplant-related investigational drugs according to established protocols and the organization's policies and procedures.
- OBJ E5.1.3 (Comprehension) Compare and contrast record-keeping requirements of various agencies regulating transplant-related clinical research studies.
  - IO Explain the process for reporting adverse reactions to drugs used in a transplant-related investigational protocol.*

**Outcome E6: Demonstrate skills required to function in an academic setting.**

- Goal E6.1 Understand faculty roles and responsibilities.
  - OBJ E6.1.1 (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 E6.1.2 (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 E6.1.3 (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 E6.1.4 (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 E6.1.5 (Comprehension) Discuss the promotion and 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 E6.1.6 (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 E6.1.7 (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 E6.2 Exercise teaching skills essential to pharmacy faculty.
- OBJ E6.2.1 (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 E6.2.2 (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 E6.2.3 (Application) Develop and deliver cases for workshops and 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 E6.2.4 (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 E6.2.5 (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 E6.2.6 (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 E6.2.7 (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 E6.2.8 (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 E6.2.9 (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.*

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The effective date for implementation of these educational outcomes, goals and objectives is July 1, 2008.

## Appendix

### *PGY2 Pharmacy Residencies in Solid Organ Transplant*

PGY2 pharmacy residencies in solid organ transplant may vary according to the types of transplantation performed by the organization's transplant program. However, learning experiences in direct patient care occurring in both acute and ambulatory practice settings are expected. A pharmacy residency in solid organ transplant must provide direct clinical experience and build core didactic knowledge in a minimum of two of the following types of transplantation:

- Heart
- Intestine
- Kidney
- Liver
- Lung
- Pancreas/islet

Other learning experiences may be tailored to the specific needs and interests of the resident. Solid organ transplant pharmacy residency programs that are able to offer experience with any of the following should consider their inclusion in core or elective learning experiences:

- Advanced critical care
- Bone marrow/stem cell transplant
- Clinical research
- Corneal transplant
- Pediatric transplant
- Transplant infectious disease

The following is an extensive listing of diagnoses leading to transplant, as categorized by the United Network for Organ Sharing (UNOS). While this is provided as a resource, it is left to the discretion of the program director to select the particular disease states and aspects of management most relevant to their program goals. In this sense, it is anticipated that those disease states comprising a larger fraction of transplant indications and those with implications for recipient preparation or post-transplant management (i.e., due to recurrence or other complications requiring management) would receive greater emphasis.

#### I. Diseases or conditions that frequently underlie and indication for:

##### A. Kidney transplantation

1. Congenital, rare familial, and metabolic disorders
2. Diabetes
3. Glomerular disease
4. Hypertensive nephrosclerosis
5. Neoplasms
6. Polycystic kidneys
7. Renovascular and other vascular diseases
8. Tubular and interstitial diseases
9. Retransplant/graft failure

10. Other renal diseases
  - B. Pancreas and/or islet cell
    1. Diabetes mellitus, type 1 or 2
    2. Diabetes secondary to chronic pancreatitis or cystic fibrosis without pancreatectomy
    3. Pancreatectomy prior to pancreas transplant
    4. Pancreatic, bile duct or other cancer
    5. Graft failure/retransplantation
  - C. Liver transplantation
    1. Acute hepatic necrosis
    2. Biliary atresia
    3. Cholestatic liver disease/cirrhosis
    4. Malignant neoplasms
    5. Metabolic diseases
    6. Non-cholestatic cirrhosis
    7. Other hepatic diseases
  - D. Intestine transplantation
    1. Functional bowel problem
    2. Short gut syndrome
    3. Graft failure/retransplant
    4. Other intestinal disorders
  - E. Heart transplantation
    1. Cardiomyopathy
    2. Congenital heart disease
    3. Coronary artery disease
    4. Valvular heart disease
    5. Retransplant/graft failure
    6. Other cardiac diseases
  - F. Lung transplantation
    1. Congenital disease
    2. Emphysema/COPD
    3. Cystic fibrosis
    4. Idiopathic pulmonary fibrosis
    5. Primary pulmonary hypertension
    6. Alpha-1-antitrypsin deficiency
    7. Retransplant/graft failure
    8. Other pulmonary diseases
- II. Diseases or conditions that frequently occur or reoccur after transplantation:
- A. Post-transplant infection considerations
    1. Central venous catheter infections and treatment options
    2. Dental procedure prophylaxis
    3. HBV prophylaxis and treatment
    4. HCV prophylaxis and treatment
    5. Herpes simplex and zoster
    6. Immunization recommendations
      - a) Pre-transplant



- b) Post-transplant
- 7. Infection prophylaxis monitoring and treatment
  - a) CMV and EBV
  - b) Anti-fungal
  - c) PCP
- 8. Infectious exposure management
  - a) Measles
  - b) Varicella (chicken pox)
- 9. Parvovirus
- 10. Polyoma virus nephropathy (screening and treatment)
- 11. Surgical infectious prophylaxis
- 12. Sepsis
- 13. Timing of post-transplant infections (0-30 days, 30-180 days, >180 days)
- 14. Tuberculosis
- 15. Urinary tract infections/pyelonephritis
- B. Post-transplant malignancy considerations
  - 1. Kaposi's sarcoma
  - 2. Lymphoma
  - 3. Post-transplant lymphoproliferative disease (PTLD)
  - 4. Risk of new malignancy or recurrent malignancy
  - 5. Skin cancer
- C. Other organ-specific considerations
  - 1. Cardiovascular
    - a) Cardiac allograft vasculopathy (CAV)
    - b) Cardiovascular risk management
    - c) Congestive heart failure (CHF)
    - d) Coronary artery disease (CAD)
    - e) Hemodynamic conditions
    - f) Hyperlipidemia
    - g) Hypertension
    - h) Orthostatic hypotension
  - 2. Endocrine
    - a) New onset diabetes mellitus after transplantation (NODAT)
    - b) Metabolic diseases (metabolic syndrome)
    - c) Hyperparathyroidism
    - d) Osteoporosis/bone disease
    - e) Gout
    - f) Pancreatitis
  - 3. Erectile dysfunction
  - 4. Gastrointestinal
    - a) Malnutrition/anorexia
    - b) Nausea/vomiting/diarrhea

5. Hematologic
    - a) Bone marrow suppression (leukopenia, anemia, thrombocytopenia)
    - b) Post transplant erythrocytosis (PTE)
  6. Hepatic
    - a) Biliary complications and management
    - b) Hepatotoxicity
    - c) Vanishing bile duct syndrome
  7. Neurological
    - a) CNI neurotoxicity
    - b) Depression
    - c) Headache
    - d) Neurogenic bladder
  8. Pulmonary
    - a) Bronchiolitis obliterans organizing pneumonia (BOOP)
    - b) Interstitial pneumonitis
    - c) Pulmonary edema
  9. Renal
    - a) Acute tubular necrosis
    - b) Chronic allograft nephropathy
    - c) CNI nephrotoxicity
    - d) Dehydration
    - e) Electrolyte imbalances
    - f) HUS/TTP (CNI/rapa-related versus other etiologies)
    - g) Proteinuria
    - h) Renal tubular acidosis
- D. Surgical/technical complications
1. Bleeding
  2. Hydronephrosis
  3. Ischemia/reperfusion Injury
  4. Lymphocele
  5. Obstruction/leak
  6. Pain
  7. Primary graft non-function
  8. Technical graft loss
  9. Thrombosis
- E. Common recurrent diseases
1. Liver
    - a) Autoimmune hepatitis
    - b) Biliary cirrhosis
    - c) Hepatitis viral infection
    - d) Hepatocellular carcinoma (HCC)
    - e) Non-alcoholic steatohepatitis (NASH)

2. Kidney
  - a) Focal segmental glomerulosclerosis (FSGS)
  - b) IgA nephropathy
  - c) Membranous glomerulonephritis (GN)
  - d) Systemic lupus erythematosus (SLE)
  - e) Other autoimmune diseases
3. Pancreas/Islet
  - a) Diabetes mellitus type I
  - b) Diabetes mellitus type II

III. Types of rejection that may occur after transplantation:

- A. Antibody mediated (acute humoral)
- B. Chronic (immunologic and non-immunologic causes)
- C. Hyper-acute
- D. T-cell mediated (acute cellular)