

Managing Long-Term Outcomes for Kidney Transplant Patients: An Integrated Needs Assessment

Community Nephrologists

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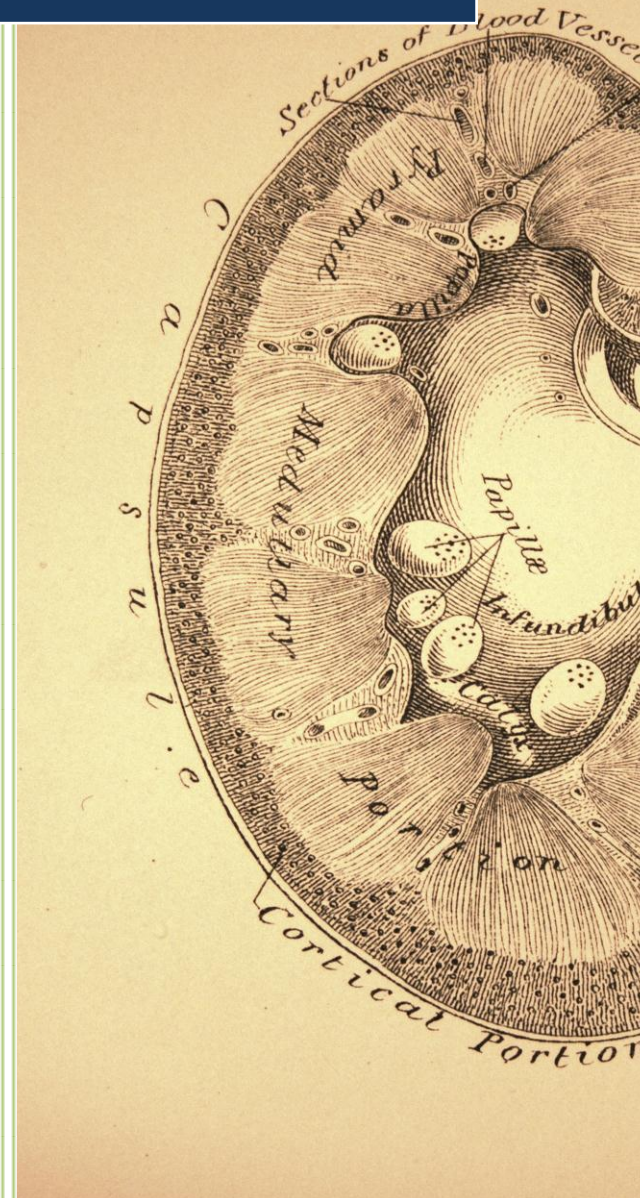


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Executive Summary

Since the first successful kidney transplant between identical twins in 1954, surgical techniques, pharmacotherapy, and organ donor registries have improved, making renal transplant the therapy of choice for a growing number of individuals.

Short-term care of kidney transplant patients focuses on suppressing the immune system to prevent the body from rejecting the new organ. This necessitates strong immunosuppressive medication that leaves the patient vulnerable to infection. Over time, the drug dosage is lowered and the risk of infection lessens, but kidney transplant recipients must take immunosuppressive medication for the rest of their lives. These drugs have serious adverse effects, including cancer, diabetes, bone disease, hypertension, dyslipidemia, and many other medical conditions. Physicians who manage the long-term care of kidney transplant patients must identify treatment that maximizes kidney function and averts rejection while simultaneously minimizing the risk of short- and long-term adverse effects.

In the United States, the increasing population with end-stage renal disease, better survival rates among transplant recipients, and advances in surgery and medicine that make transplant an increasingly viable option all contribute to the growing number of individuals living with a donor kidney. Increasingly, community nephrologists — together with urologists, surgeons, and other health care professionals — are expected to actively participate in the management of kidney transplant recipients, and more and more community-based primary care physicians see these patients in their daily practices. Consequently, communication, coordination of care, delineation of roles and responsibilities, and effective referral procedures are key issues in the management of transplant patients.

This integrated needs assessment was designed to:

- Identify and quantify the attitudes and educational and behavioral needs of community nephrologists surrounding the care of patients with kidney transplants.
- Assess current clinical performance to assure long-term graft and patient survival.
- Identify learning preferences, including educational interventions, preferred by community nephrologists.
- Quantify the forces, attitudes, and barriers to practice improvement and the corresponding readiness of physicians to change.

Addressing gaps surrounding the management of the kidney transplant patient requires a multifaceted evaluation of the forces that impact patient care so appropriate educational strategies can be designed. Identifying variables that impact physician behavior is key to meeting educational challenges and

capitalizing on learning opportunities. This needs assessment project integrates data from the following sources to identify opportunities for physician education:

- Survey and analysis of clinical literature surrounding post-graft management and chronic care of kidney transplant patients.
- Review of relevant clinical guidelines on kidney transplant care.
- In-depth interviews with stakeholders, including transplant surgeons, nephrologists, urologists, and associated health care professionals.
- Analysis from a validated assessment tool completed by more than 200 specialists. The tool assessed clinician treatment behavior, perceived competency, barriers to care, clinical knowledge, and educational preferences.

This targeted report presents specific qualitative and quantitative findings from the community nephrologist population.

This needs assessment was funded through an educational grant from Pfizer Medical Education Group. The project was completed using a collaborative process between the participating organizations; no one member could have completed this rigorous analysis without the challenge and support of the others. This spirit of collaboration should continue with continuing medical education professionals designing education and interventions to improve the ongoing care of kidney transplant patients.

Table of Contents

Executive Summary.....	1
Table of Contents.....	3
Needs Assessment Overview	4
Needs Assessment Methodology.....	5
Qualitative Results	8
Quantitative Results.....	14
Appendix 1: Quantitative Assessment Tool	35
Appendix 2: Additional Data Charts.....	42
Appendix 3: References	50

Needs Assessment Overview

The behavior of physicians and health care professionals depends not only on skill and knowledge, but also on the clinical environment and the forces at play within that environment. For physicians and health professionals to change, systems and stakeholders must also change. This needs assessment was designed to:

- Identify barriers to best practice at individual and system levels
- Develop tools to assess the knowledge, attitudes, and practice gaps of community nephrologists
- Assess the knowledge, skill, and/or attitude gaps of community nephrologists related to the care of the kidney transplant patient
- Determine how various factors, including systems factors, work together to accelerate or impede clinician adherence to best evidence
- Identify optimal change strategies and the resources to close the identified gaps

Research Questions

The following questions regarding the care of kidney transplant patients were addressed during this study:

- How are physicians and health care professionals managing patients through the life of the graft compared to consensus statements and standards of care?
- How do clinicians perceive their own care of kidney transplant patients?
- What gaps in knowledge, attitude, skills, and behavior exist that can be addressed through education?
- What are the most appropriate formats for educational interventions?

Stakeholders

This larger needs assessment project focused on three populations: community nephrologists, transplant specialists (primarily nephrologists who practice at transplant centers), and transplant surgeons—including urologists, nephrologists and general surgeons—who manage care of kidney transplant patients. Transplant coordinators and nurses who work with these patients were also included in the qualitative components of the needs assessment in order to provide a broader perspective of the physician needs.

This report presents quantitative and qualitative needs assessment results from community nephrologists, as well as touching on comparisons and interactions between the three target groups. Specific results for transplant specialists and transplant surgeons, as well as a comprehensive project report, are available as separate documents.

Needs Assessment Methodology

To identify the educational strategies needed to close the gaps in care, we first performed a thorough and detailed review of evidence-based literature, observational studies, guidelines, consensus statements, and research initiatives surrounding the care of kidney transplant patients. **Table 1** outlines various clinical guideline statements consulted during this process.

Guideline Title	Organization	Year(s) of Publication
Caring for Australasians with Renal Impairment (CARI) Transplantation Guidelines ⁱ	Australian and New Zealand Society of Nephrology (ANZSN), Board of Kidney Health Australia (KHA)	2005-2010 (various)
KDOQI Guidelines for CKD Care and Dialysis Care ⁱⁱ	National Kidney Foundation Kidney Disease Outcome Quality Initiative (NKF KDOQI)	2000-2009 (various)
KDIGO Guideline for the Care of the Transplant Patient ⁱⁱⁱ	Kidney Disease: Improving Global Outcomes (KDIGO)	2009
Guidelines on Renal Transplantation ^{iv}	European Association of Urology	2003 (full-text update 2009)
Immunosuppressive therapy for renal transplantation in adults ^v	National Institute for Clinical Excellence (NICE)	2004
European Best Practice Guidelines for Transplantation ^{vi, vii}	European Renal Association, European Dialysis and Transplant Association	2000 (Part 1) ; 2002 (Part 2)
United Kingdom Guidelines for Living Donor Kidney Transplantation ^{viii}	British Transplantation Society, the Renal Association	2000

Table 1: Clinical Guideline Documents for Kidney Transplantation and Disease

Of these documents, the main evidence-based comprehensive clinical guideline for the ongoing care of kidney transplant patients is a 2009 publication from *Kidney Disease: Improving Global Outcomes* (KDIGO). Results from 3,168 randomized control trials, 7,543 cohort studies, and 1,609 reviews informed the *KDIGO* recommendations, while previous publications on long-term management—such as part two of the European Best Practice Guidelines for Renal Transplantation, released in 2002—were based primarily on expert opinion.¹²

After the literature assessment was complete, we employed a number of distinct needs assessment techniques to identify gaps and determine the barriers to providing optimal patient care. These techniques included in-depth interviews with stakeholders, focus groups with target audiences, a Change Readiness Inventory® (CRI), a knowledge assessment tool, and a practice assessment tool.

Individually, each needs assessment component provides a unique perspective into the actual and perceived needs of clinicians as well as their barriers to best practice. Moreover, the systematic and integrated evaluation of all needs assessment components identifies and validates knowledge, attitudes, competencies, current clinical practices, and external systems barriers.

All needs assessment methods were designed to reflect the diversity of the practice settings in which care is provided. The provider-focused needs assessment methodology described below provides a multi-dimensional perspective on educational needs; results may be used to inform the development of educational interventions and encourage maximal impact on educational, behavioral, and clinical outcomes.

Qualitative Assessment

Interviews

To better target the needs of the learner, five in-depth interviews were conducted with community nephrologists. They served to identify key issues and influences on clinical behavior, patient management, and educational needs. The interviews also helped identify touch points in the diagnosis, treatment, and long-term management of the kidney transplant patient as well as explore practice management issues that impact therapeutic decision-making. Forty-one interviews were also conducted with other stakeholders who work with community nephrologists to provide care to kidney transplant patients, including transplant surgeons, urologists, and transplant coordinators.

Project partners used the resulting information gathered through the literature review to create an interview guide that was then reviewed by a clinical expert. The interviews were conducted by telephone and lasted approximately one hour; participants were compensated for their time. Researchers used existing partner relationships to access interview participants.

Focus Groups

Project partners conducted and moderated focus groups in order to better understand the influence that each stakeholder group has on the clinical approach to and the long-term management of kidney transplant patients. This approach allowed researchers to discuss the topic areas of the one-on-one interviews in a group setting and develop the assessment tools for the quantitative phase of research.

Two of the focus groups consisted of mixed-specialty teams, including community nephrologists, from transplant centers in Detroit, MI (March 2011) and Birmingham, AL (April 2011). Other group participants included transplant surgeons, transplant coordinators, and transplant specialists (nephrologists).

Quantitative Assessment

Information from the interviews and focus groups aided in developing and refining the online assessment tool, consisting of three distinct sections. Each section provided valuable quantitative information and, cumulatively, allowed analysis on the perceived and actual needs of the learners. The three sections of the assessment are highlighted below:

- *Change Readiness Inventory® (CRI)*: The CRI measured attitudes, perceived needs, and barriers in clinical practices. The *clinical competencies* section was developed in cooperation with clinical experts from the American Society of Transplantation, referencing current literature. This section was used to establish the *perceived needs* of the target audience.
- *Knowledge and Practice Assessment tools*: These tools were designed to assess current knowledge and actual clinical behavior related to the long-term care of kidney transplant patients. The tools assessed a comprehensive baseline of physicians' knowledge and clinical care behavior in the management of immunosuppressive therapy as well as the recognition and treatment of common co-morbidities in transplant patients. The knowledge and practice assessment tools provided a self-report of clinicians' attitudes and behaviors surrounding the delivery of care and collected details regarding specific treatment modalities and reasons for treatment choices. Results present a quantitative measure of clinician's knowledge and skill gaps.
- *Educational Preferences Assessment*: The final portion of the quantitative survey assessed educational preferences. Questions were designed to determine the best formats in which to present educational activities. This helps to identify the preferred topics, design, learning format, and platform for the target learner groups. From this information, educational planners may design interventions that provide the greatest potential to impact clinical practice and patient health.

Specific survey questions were developed by Healthcare Performance Consulting, the American Urological Association, and the American Society of Transplantation. Items were reviewed by clinical experts and validated with a sample of the target audiences. The survey was posted online and a link was disseminated via email to members of the three target audiences.

The survey was distributed to community nephrologists recruited through ResearchNow (an online panel provider with a validated clinical panel), and transplant specialists, recruited through the membership of the American Society of Transplantation. A total of 197 surveys were distributed and 146 were returned, for a response rate of 74 percent. The transplant specialist group consisted of nephrologists with additional training in transplant medicine. All respondents were further screened to ensure that they matched the target audience and provided care to kidney transplant recipients.

The complete text of the survey can be viewed in Appendix 1 (page 37).

Qualitative Results

The in-depth interviews and focus groups were designed to assess key issues and influences on the complex management of kidney transplant patients. The interviews identified numerous challenges in coordinating the care of patients throughout their transplant journey, from the patient's initial referral to a transplant center, to the subsequent transition of the patient back to the community nephrologist, to the continuing care of the patient for ongoing primary care issues.

Stakeholders stated that the management of kidney transplant patients is challenging, time-consuming, and often requires a great deal of communication and coordination of care. Major challenges include managing immunosuppressive therapy, managing co-morbidities that often worsen after transplant, patient adherence and compliance issues, and monitoring and screening for signs of organ rejection, cancer, infections, and osteopenia. The issues that were discussed were consolidated into key themes, exemplified by direct quotes gathered from interviewees.

Coordination and Continuity of Care

Care must be carefully coordinated between the community/referring nephrologist and the transplant center both before and after the transplant. A number of challenges, both systemic and personal, affect this coordination of care. Communication between various physicians who care for the patient is, at times, sub-optimal. Often, reports such as doctor visits, labs, or screenings are not communicated in a timely manner between the primary care physician, community nephrologist, and transplant center. For the first three months after transplant, patients are seen primarily by the transplant specialist and surgeon; after three months, care is typically transitioned to the community nephrologist and/or the primary care physician and other specialists.

Ideally, the transplant centers would see patients quarterly for one year post-transplant and once a year thereafter; in actuality, this schedule varies widely. Patient distance from the transplant center, access to a community nephrologist, and patient preference play a role in how post-transplant care is provided. Patients located far from the transplant center may not return as frequently. Ideally, the nephrologist monitors kidney function and frequently co-manages co-morbidities with a primary care provider or other specialist(s). However, some patients do not have access to a community nephrologist, and are cared for by a primary care provider; other patients who see a community nephrologist may or may not have a primary care doctor as well. Either one may manage cancer screenings, monitor for osteoporosis and risk of infections, and provide appropriate vaccinations. The transplant center most often manages any changes to immunosuppression, but relies on the community nephrologist or primary care provider to communicate lab results or other patient data.

Busy community nephrology practices may lose track of transplant patients after a period of time. Patient and family education is crucial to ensure that patients get the appropriate screenings and are

alert to additional risks for illness and disease, such as osteoporosis, certain cancers, and infection. Patient understanding that immunosuppression places them at greater risk for these conditions contributes to their motivation and adherence to appointments and medication regimens.

The development of protocols and communication strategies to identify a lead physician in ordering surveillance testing would benefit providers and patients. Up-to-date patient information should be shared in a timely manner.

“Patient management post-transplant is the art and science of medicine – the challenge of balancing immunosuppression efficacy versus side effects, toxicity and patient tolerance.”

Patient Diversity

Kidney transplant candidates represent a broad spectrum of patients: from relatively healthy to those with multiple co-morbidities and chronic diseases; from wealthy to poor; and from motivated to unmotivated. The ages of transplant patients range from teens to seniors, each presenting unique needs and challenges. Generally, younger patients tend to be less adherent. Pre- and post-transplant patient assessments by health care team members attempt to identify specific patient management issues.

Management of Co-Morbidities and Complicated Drug Regimens

Interviewees across all specialties note the many challenges in managing the multiple co-morbidities seen in transplant patients. Some of the most common co-morbidities include diabetes, kidney disease, hypertension and hyperlipidemia. Because most of these are treated with medication, the potential for drug interactions with immunosuppressive therapy is a major concern. Clinicians are apprehensive about pharmacies making generic substitutions, especially for immunosuppression medications that they feel may not be therapeutically equivalent. Interviewees also indicated that this switch confuses patients, since the pills may be a different color and shape. When asked about educational needs, participants listed ‘improving their ability to manage multiple co-morbidities’ and ‘recognizing the signs and symptoms of drug interactions’ as areas of interest.

“Pharmacy can change immunosuppression meds to generic willy-nilly, and it can be a problem for patients to recognize pills.”

Patient Adherence

Clinicians across all specialties agree that patient adherence (patient compliance) is an important, challenging, and time-consuming issue that affects all members of the health care team (transplant surgeon, nephrologist, coordinator, social worker, pharmacist, community nephrologist, and primary care physician). The complexities involved in managing the transplant patient present a challenge to patient adherence. Numerous financial issues play a role as well, including loss of a job and/or changes in insurance coverage, the costs of multiple medications, the costs associated with numerous doctor and lab appointments, and periodic visits to the transplant center. According to the clinicians, taking time off work to go to doctors' appointments, traveling to the transplant center, and transportation costs all were of concern to patients as well. Furthermore, patients may lose Medicare and/or Medicaid coverage at three years post-transplant.

Motivating patients to follow long-term, complex treatment plans is also a challenge. While younger patients and teens are often less adherent, family members play an integral part in ensuring that patients of all ages follow physician recommendations. If adherence is a concern, drug levels may be periodically checked to detect if the patient is taking his or her medications as prescribed. Some patients develop a strong, supportive relationship with the dialysis center staff and experience feelings of loss following transplant, which may affect adherence as well. Patients who are doing well post-transplant may skip follow-up appointments, lab work, and medications; though some can tolerate this, others will get into trouble. Frequently, patients are evaluated by a social worker pre-transplant to determine the likeliness of compliance post-transplant (e.g., was the patient compliant with dialysis, doctor's appointments, and lab work?).

Educational needs in this area include developing processes to educate patients and family members on the importance of long-term adherence and establishing communication guidelines, protocols, and adherence monitoring strategies. Helping patients access community resources that cover medication costs may also have a positive impact on patient adherence.

“Compliance with medications long-term can be challenging. Patients who are doing well may skip doctors' appointments, lab work, and meds: some will get by, and some will run into problems.”

Treatment Protocols and Guidelines

Treatment protocols and recommendations for patient follow-up are developed by transplant teams (transplant surgeons and transplant specialists at each transplant center) and are based on clinical evidence from the literature as well as transplant center experience. Whenever possible, the transplant team develops standing orders and then customizes treatment based on individual patient needs.

National guidelines are used to manage multiple co-morbidities, although most accepted national guidelines for chronic disease and co-morbid conditions are not specific to transplant patients. AST, *KDIGO* and KDOQI guidelines were mentioned as providing useful general recommendations for patients with chronic kidney disease, although there are fewer evidence-based guidelines specifically for transplant patients. Some clinicians were not aware of specific guidelines for transplant patients.

Interviewees report that they rely heavily on teamwork to develop and update protocols. Typically, protocols are reviewed on an annual basis or when there is a change in leadership at the transplant center, and revised as needed. Educational needs in this area include developing a mechanism to educate community nephrologists and primary care providers (PCPs) on any protocol changes. Because community nephrologists and primary care clinicians may care for patients from multiple transplant centers with varying protocols, communication is vital to maintaining optimal patient care.

Immunosuppression and the Use of Steroids

In managing immunosuppression, it is a challenge to balance the risk for toxicity (over-immunosuppression) with the risk of rejection (under-immunosuppression). Patients who receive multiple transplants represent additional challenges, as they develop more antibodies and have a greater risk for graft rejection; therefore, every effort is made to encourage the first kidney transplant to last as long as possible. Most transplants are successful for at least five years. Years five to 10 post-transplant are often more difficult due to the long-term effects of immunosuppression and worsening co-morbidities. A transplant lasting 10 to 15 years is considered a very good result.

“Managing the risk of toxicity due to over-immunosuppression vs. the risk of rejection due to under-immunosuppression is complex. A kidney transplant survival of five to 1 years is considered good.”

Identifying potential drug interactions is a continual process. Risk factors and signs and symptoms of rejection must be frequently monitored (e.g., trends in creatinine levels, ultrasound if obstruction is suspected, biopsy if there are concerns about rejection, testing for BKV and CMV).

Interviewees expressed an interest in education related to best practice protocols, case studies on managing immunosuppression in first-time and repeat transplant patients, and how to manage adverse events related to over- or under- immunosuppression. Information on best practices and results for various steroid use protocols (steroid free, steroid minimization, and rapid tapering) would also be valuable.

“There is consensus that avoiding or minimizing steroids is the right approach due to side effects and aggravating comorbidities, though there is variation on how this is done.”

Confidence and Competence of Community Nephrologists

There is considerable variation in community nephrologists’ knowledge, interest, and confidence in managing kidney transplant patients. This may be related to the number of years the physician has been in clinical practice, his or her experience in managing transplant patients, and the physician’s relationship with the transplant center. There have been many changes in the transplant field over the past 10 years, and some physicians have not kept up to date. Some interviewees from all specialties felt that some older community nephrologists may not refer patients for transplant soon enough. Some nephrologists feel that patients should try dialysis for a period of time before considering a transplant.

Educational Opportunities for Community Nephrologists

Community nephrologists and primary care providers often have busy practices that make it difficult to stay up to date, and some interviewees felt that transplant patients “fall through the cracks”. Interviewees reported working with primary care practices who see a high volume of patients and community nephrologists who are often busy with dialysis patients, who are considered the “bread and butter” of a community nephrology practice. Since community nephrologists get little training in managing transplant patients, educating them on recent changes in pre- and post-transplant patient management would be beneficial. Interviewees also felt that educating primary care physicians may be challenging, since they are often too busy to deal with the complex issues facing transplant patients.

“Community nephrologists are best positioned to manage the transplant patient long term, but often need help with managing comorbidities, immunosuppression, monitoring kidney function, and recognizing patients with chronic kidney disease or impaired kidney function even if creatinine is good.”

Based on the interviews, potential educational topics for community nephrologists and primary care physicians include:

- Managing complex drug regimens
- Managing multiple co-morbidities
- Recognizing signs and symptoms of inappropriate immunosuppression
- Balancing side effects of immunosuppression (effect on viral infections, co-morbidities)
- Reinforcing the importance of consistently monitoring serum creatinine to identify trends and compare to baseline

- Stressing the importance of monitoring for BKV and/or CMV
- Performing an ultrasound if an obstruction is suspected or if creatinine is increasing
- Providing information and data on changes to biopsy protocols, including doing a biopsy if there is an unexplained creatinine trend or a suspected BKV infection
- Identifying and addressing drug interactions
- Monitoring for signs and symptoms of rejection
- Encouraging timely referral back to the transplant center
- Providing tips on patient education to ensure adherence
- Stressing coordination of care issues and establishing ongoing relationships with transplant coordinators

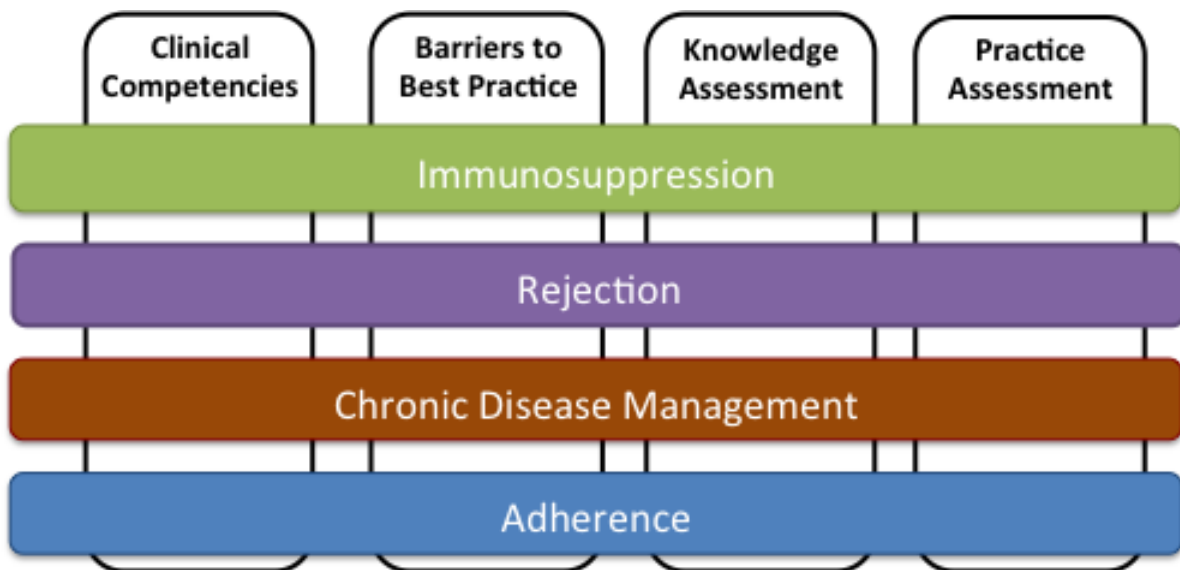
Quantitative Results

Development of Quantitative Survey Instrument

After all in-depth stakeholder interviews and focus groups were complete, project partners performed a careful review and analysis of all available data in order to create a framework for a qualitative physician survey. Researchers determined that the most relevant issues in patient care could be categorized into four overarching themes:

1. Selection and management of immunosuppression therapy,
2. Risk and detection of graft rejection,
3. Chronic care of the kidney transplant patient (including management of co-morbidities and chronic disease), and
4. Patient adherence to therapy.

All sections of the quantitative survey were designed to collect further data in each of these four topics, as illustrated in the following graphic. Throughout this document, charts and items that relate to each topic will be color-coded according to the graphic below: *immunosuppression* is green, *rejection* is purple, *chronic disease management* is maroon, and *adherence* is blue.



The individual quantitative assessment tools—which assessed competency, barriers to best practice, knowledge, and practice—were combined into a single survey in order to define relationships between knowledge, clinical practices, competencies and barriers. The relationship between these items is shown below in **Table 3**. While some items overlap and correlate, they may be grouped into 4 basic categories:

Immunosuppression, Rejection, Chronic Care, and Patient Adherence. The groups and related charts will be color-coded throughout this report to reflect this correlation. Qualitative findings and educational implications also fall neatly within these categories, and will be organized and color-coded accordingly.

Competencies	Barriers	Knowledge Questions	Practice Questions
Immunosuppression			
<p>C1....select an effective immunosuppressive drug regimen that attains adequate protection of the kidney allograft against rejection.</p> <p>C2....minimize short- and long-term adverse side effects of immunosuppressive medications.</p> <p>C3....identify potential interactions between immunosuppressive agents and other medications.</p>	<p>B1. I do not always have access to the patient information that I need to make the best decision about patient management.</p> <p>B3. We are not able to utilize the best therapies due to cost constraints.</p> <p>B4. Many patients cannot afford the treatments that will keep them healthy.</p> <p>B6. Primary care physicians are not adequately trained to manage the complexity of a transplant patient.</p>	K1,K2,K3, K4,K7	P1, P2, P3
Rejection			
<p>C4....identify risk factors for acute rejection.</p> <p>C5....detect signs and symptoms of acute graft rejection by monitoring creatinine levels.</p> <p>C6.... attain an allograft biopsy to determine if rejection is occurring.</p>	<p>B1. I do not always have access to the patient information that I need to make the best decision about patient management.</p> <p>B2. Access to the transplant center is limited.</p> <p>B4. Many patients cannot afford the treatments that will keep them healthy.</p> <p>B6. Primary care physicians are not adequately trained to manage the complexity of a transplant patient.</p> <p>B8. There is too much of a delay between when a patient first shows elevated creatinine and when they return to the center for appropriate testing and management.</p>	K5	P3
Chronic Care			
<p>C7....coordinate with other specialists or primary care physicians to manage co-morbid conditions (diabetes, hypertension, cardiovascular disease).</p> <p>C8....use screenings to detect cancer in the transplant patient.</p> <p>C9... monitor as appropriate for osteoporosis (calcium serum levels, phosphorus, bone-mineral density, and plasma intact PTH).</p> <p>C10....mitigate risk of infection by appropriate use of prophylactic antibiotic, antiviral and antimycotic treatment.</p> <p>C11....appropriately vaccinate six months post-transplant using inactive vaccines.</p>	<p>B1. I do not always have access to the patient information that I need to make the best decision about patient management</p> <p>B2. Access to the transplant center is limited and causes problems.</p> <p>B6. Primary care physicians are not adequately trained to manage the complexity of a transplant patient.</p> <p>B7. There is insufficient staff in our practice/facility to be able to support transplant patients as well as we should.</p> <p>B8. There is too much of a delay between when a patient first shows elevated creatinine and when they return to the center for appropriate testing and management.</p> <p>B9. Coordination of care for co-morbid conditions causes problems.</p>	K6, K8, K9, K10, K11, K12	P5, P6, P7, P9, P10

Adherence			
C12....identify risk-factors for non-adherence to medication regimens. C13....effectively communicate risks of non-adherence to patients and family	B4. Many patients cannot afford the treatments that will keep them healthy. B5. Patients are not honest with me about adherence to their treatments	No related knowledge questions	P8

Table 3: Relationships Between Competencies, Barriers, and Knowledge/Practice Questions
(Immunosuppression, Rejection, Chronic Care, Adherence)

Demographics

The assessment was distributed to three target specialties” community nephrologists, transplant surgeons, and transplant nephrologists. Responses were distributed evenly between the three specialty groups (Figure 1, below).

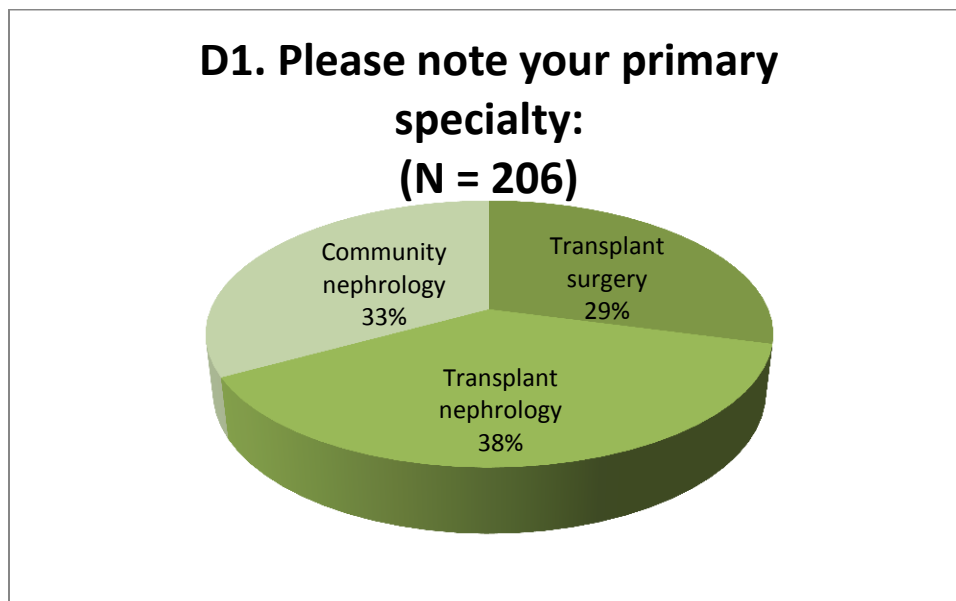


Figure 1: Primary Specialty

Of 206 total respondents, 68 identified themselves as community nephrologists. The charts presented in this document graphically illustrate the responses of these 68 individuals. Select charts are included in this section; additional charts may be viewed in Appendix 2 (page 44).

Responses indicate that the majority of community nephrologists see fewer than 10 transplant patients during a typical week. Only 19% of respondents see eleven or more transplant patients (Figure 2).

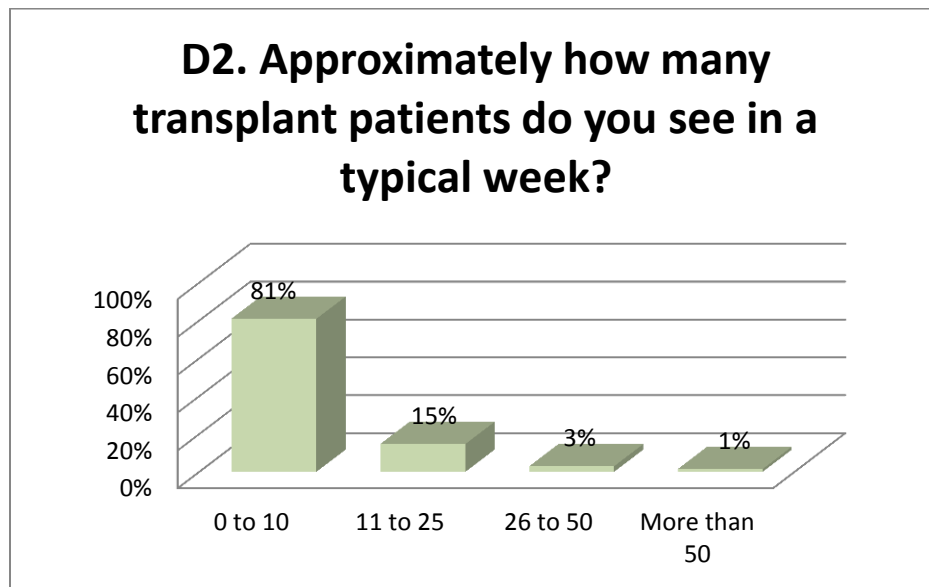


Figure 2: Patients Seen in a Typical Week

Change Readiness Inventory®

The competencies are a series of statements that represent the abilities needed to successfully manage kidney transplant patients. These competencies were developed from clinical guidelines, current literature, and expert opinion. Community nephrologists were asked to consider the following statements, then indicate both their *present* and *desired* levels of ability (from 1=low to 5=high) in performing each task.

Please rate your *present* and *desired* ability to:

- C1. Select an effective immunosuppressive drug regimen that attains adequate protection of the kidney allograft against rejection.
- C2. Minimize short- and long-term adverse side effects of immunosuppressive medications.
- C3. Identify potential interactions between immunosuppressive agents and other medications.
- C4. Identify risk factors for acute rejection.
- C5. Detect signs and symptoms of acute graft rejection by monitoring creatinine levels.
- C6. Attain an allograft biopsy to determine if rejection is occurring.
- C7. Coordinate with other specialists or primary care physicians to manage co-morbid conditions (diabetes, hypertension, cardiovascular disease).
- C8. Use screenings to detect cancer in the transplant patient.
- C9. Monitor as appropriate for osteoporosis (calcium serum levels, phosphorus, bone-mineral density, and plasma intact PTH).

- C10. Mitigate risk of infection by appropriate use of prophylactic antibiotic, antiviral and antimycotic treatment.
- C11. Appropriately vaccinate 6 months post-transplant using inactive vaccines.
- C12. Identify risk-factors for non-adherence to medication regimens.
- C13. Effectively communicate risks of non-adherence to patients and family

**Immunosuppression, Rejection, Chronic Disease, Adherence*

Present and Desired Ability: Community Nephrologists

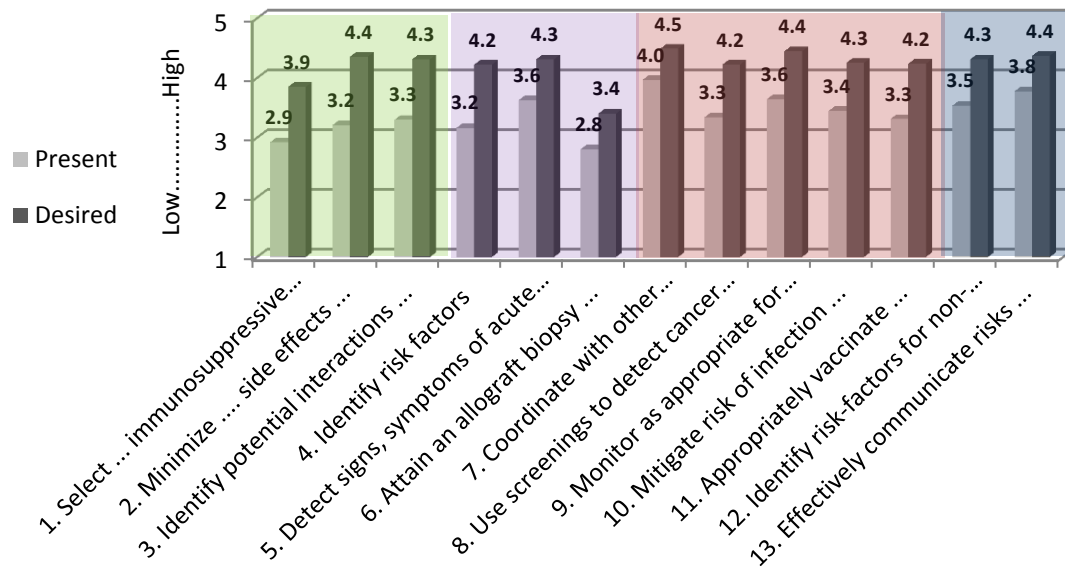


Figure 3: Community Nephrologist Present and Desired Competencies (*Immunosuppression, Rejection, Chronic Disease, Adherence*)

Figure 3 shows community nephrologists’ average rating of their own present and desired abilities. The average *desired ability* ratings range from 3.9 to 4.5, averaging 4.2 on a one to five scale. This is a somewhat lower average than desired competencies in most other clinical areas, which average closer to 4.5. This may reflect the fact that some community nephrologists prefer not to care for transplant patients and see no need for high skill levels in this area. Additionally, some community nephrologists rarely see transplant patients due to adequate coverage by transplant specialists and thus may not need high competencies in this area. The average *present ability* was 3.4 on the five-point scale, with a range of 2.8 to 4.0.

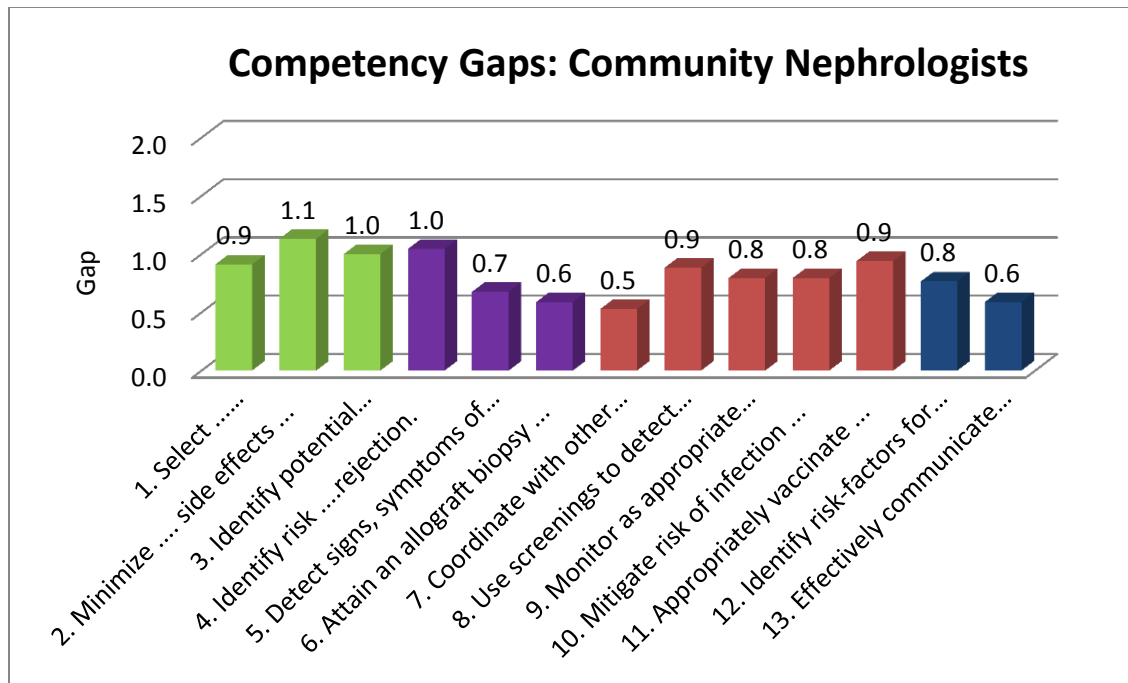


Figure 4: Community Nephrologist Competency Gaps (Immunosuppression, Rejection, Chronic Disease, Adherence)

The *perceived need* of each competency is the difference, or gap, between physicians’ ratings for *present* and *desired* levels of ability. In other words, this number represents the difference between “what is” and “what ought to be.” A gap of 0.5 is presumed to be important, with gaps of 1.0–2.0 considered ideal for clinician education. A gap smaller than 0.5 indicates low motivation to learn and change, while a gap higher than 2.0 may represent a level of change that the physician believes to be unattainable or impractical.

The average gap, or perceived need, of this competency set is 0.8 (Figure 4); individual gaps ranged from 0.5 to 1.1. All 13 of the perceived competency gaps are higher than 0.5 and are thus considered important for continuing education. Three fall within the ideal range of 1.0–2.0. Physicians realize that change is needed in this clinical area of medicine and are motivated to make practice changes. The three areas of highest perceived need are:

- C2. Minimize short- and long-term adverse side effects of immunosuppressive medications
- C4. Identify risk factors for acute rejection
- C3. Identify potential interactions between immunosuppression agents and other medications

These results indicate that the community nephrologists’ biggest concern with kidney transplant patients is in the area of appropriate immunosuppression that is effective, yet minimizes side effects. This mirrors concerns expressed during the in-depth interviews.

Barriers to Best Practice

Barriers to best practice are real or perceived issues that may prevent physicians from applying best practice. Knowledge of the nature and magnitude of these barriers helps educational designers address them within the scope of interventions, and in doing so, encourage change in physician performance as well as change in knowledge and skill. These barriers were identified using expert opinion, data from the in-depth interviews, and literature on physician change.

The next set of statements represents barriers to best practice when managing transplant patients. Please rate each statement according your level of agreement as to whether the item represents a barrier to effective management of transplant patients. (1=Strongly Disagree, 5=Strongly Agree)

- B1. I do not always have access to the patient health information that I need to make the best decisions about patient management.
- B2. Access to the transplant center is limited.
- B3. I am not able to utilize the best therapies due to cost constraints.
- B4. Many patients cannot afford the treatments that will keep them healthy.
- B5. Patients are not honest with me about adherence to their treatments.
- B6. Primary care physicians are not adequately trained to manage the complexity of a transplant patient.
- B7. There is insufficient staff in our practice/facility to be able to support transplant patients as well as we should.
- B8. There is too much of a delay between when a patient first shows elevated creatinine and when they return to the center for appropriate testing and management.
- B9. Coordination of care for co-morbid conditions causes problems.

**Immunosuppression, Rejection, Chronic Disease, Adherence*

Figure 5 shows the list of statements arranged in order of respondents' highest perceived barriers. The bars to the right represent the percentage of respondents rating the barrier high (four or five on the five-point scale), indicating agreement. The bars to the left represent the percentage of respondents rating the barrier low (one or two), indicating disagreement.

Using a 1 to 5 scale, where 1 is strongly disagree and 5 is strongly agree, please rate your level of agreement with the following statements: (n=68)

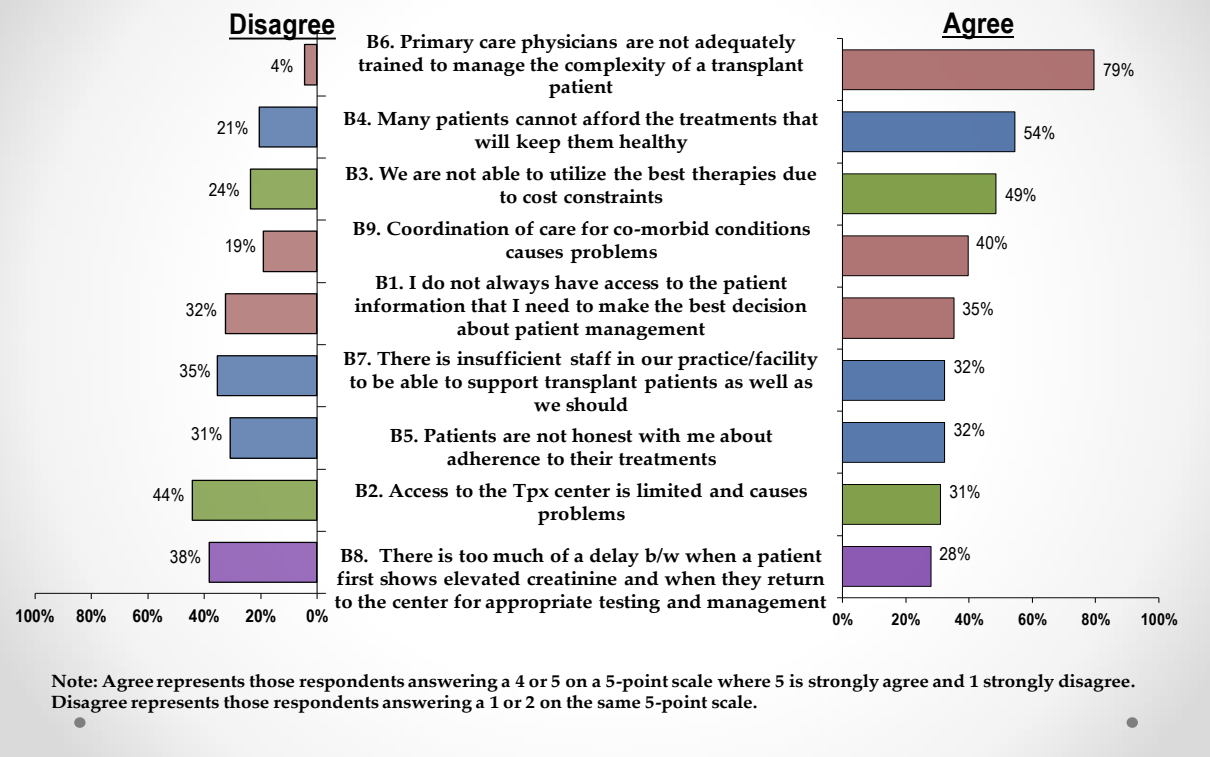


Figure 5: Community Nephrologist Barriers to Best Practice (Immunosuppression, Rejection, Chronic Disease, Adherence)

Barrier 6, *Primary care physicians are not adequately trained to manage the complexity of a transplant patient*, had both the highest percent of agreement and the lowest percent of disagreement. Clearly, this barrier stands out as a strong impediment to best practice in caring for these patients. The next two highest barriers, 4 and 3, both represent different aspects of cost constraints. Interviewees in all specialties mentioned that cost of medications often becomes a barrier when Medicare coverage expires at three years post-transplant. This contributes to lack of adherence and the clinical problems that result.

A high percentage of respondents also indicated strong agreement with Barrier 9, *Coordination of care for co-morbid conditions causes problems*, and Barrier 1, *I do not always have access to the patient information I need*. These two items are closely related in that patient information is a crucial link in the coordination of care. Closely correlated ($r=.51$) with Barrier 9 is Barrier 2, *Access to the transplant center is limited*. Although this barrier was rated high by a smaller percentage of community nephrologists, it is clear that access to the transplant center is a key factor in coordination of care for patients. This also emerged as a common theme during the interviews.

Knowledge Assessment

The Knowledge Assessment portion of the survey consisted of 14 questions designed to assess knowledge that is directly related to the clinical competencies defined above. Each question relates to a specific clinical competency.

Community nephrologist scores on the knowledge questions averaged 64 percent (Figure 6). This clearly indicates a knowledge deficit that could benefit from educational initiatives. It will be important to demonstrate this deficit to community nephrologist learners.

The entire text of questions and answers may be found in Appendix 1 (Page 37).

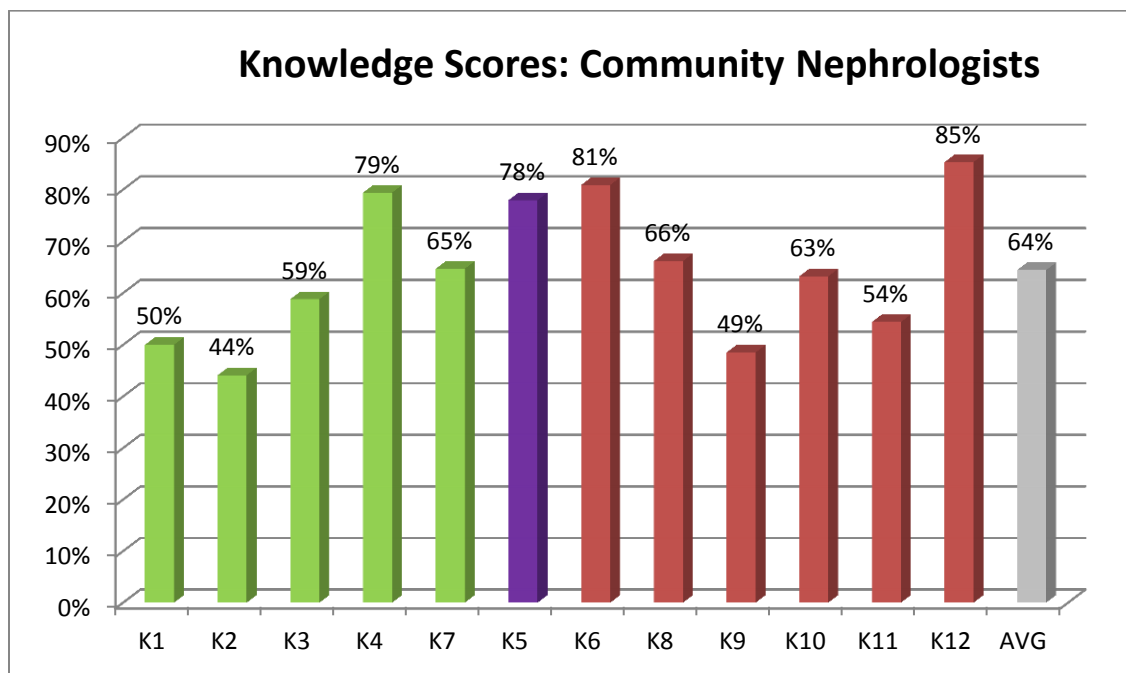


Figure 6: Community Nephrologist Knowledge Score (*Immunosuppression*, *Rejection*, *Chronic Disease*, *Adherence*)

The community nephrologists scored less than 50 percent on questions K1, K2, and K9. These items correlate most closely with competencies related to immunosuppression management (competencies C1, C2, and C3), and acute rejection (competencies C4 and C5). The gaps between present and desired ability were also highest in these competencies, indicating that perceived needs closely align with actual needs of community nephrologists in these areas.

Practice Assessment

The practice assessment questions were designed to assess actual clinical practices of community nephrologists. The results may be compared to best practices to establish real needs and their relationships to perceived needs and knowledge gaps.

One item of the assessment addresses attitude: **A1. How comfortable are you monitoring immunosuppression?** On a one to five scale, (*1=very uncomfortable and 5=very comfortable*), community nephrologists averaged 2.97. This represents nearly the midpoint of the scale, showing that on average community nephrologists are neither comfortable nor uncomfortable monitoring immunosuppression.

When asked about their role in managing immunosuppression, responses varied widely. Thirty-five percent said they play no role whatsoever, while 47 percent said that they monitor and adjust dosages as needed (Figure 7). These responses represent two very different groups of learners whose educational needs regarding immunosuppression will differ considerably.

P1. Mrs. Jones received a kidney transplant 3 months ago and has returned to your clinic to establish follow-up. What would your role be in managing her immunosuppression? (select all that apply)

I play no role in immunosuppression.

I monitor her immunosuppression and adjust dosages as needed to maintain the set targets.

I change immunosuppression medications as needed.

I let the patient decide between the community physician and the transplant center for managing immunosuppression.

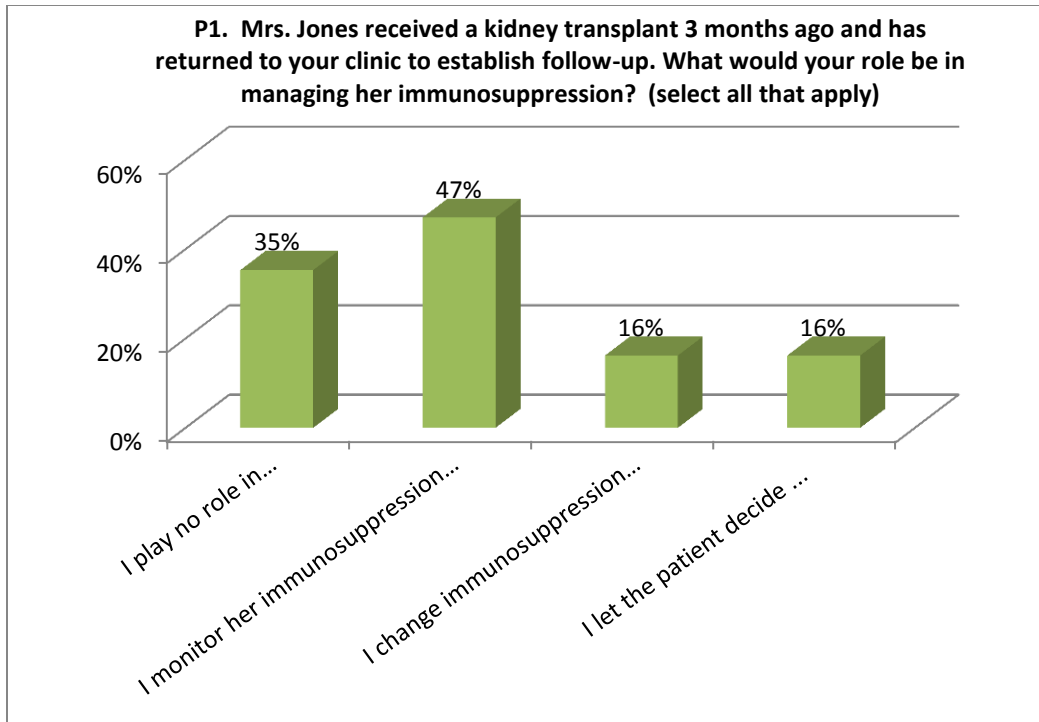


Figure 7: Community Nephrologist Role in Immunosuppression Management

When asked about their preference for managing the stable post-transplant patient (P4, Figure 8), the vast majority of respondents prefer to co-manage with the transplant center.

P4. In transplant patients with a stable post-transplant course, I prefer:

- ... to independently manage care after they are released by the transplant center
- ... to co-manage with the transplant center indefinitely
- ... the transplant center to manage until they develop progressive graft failure requiring return to dialysis

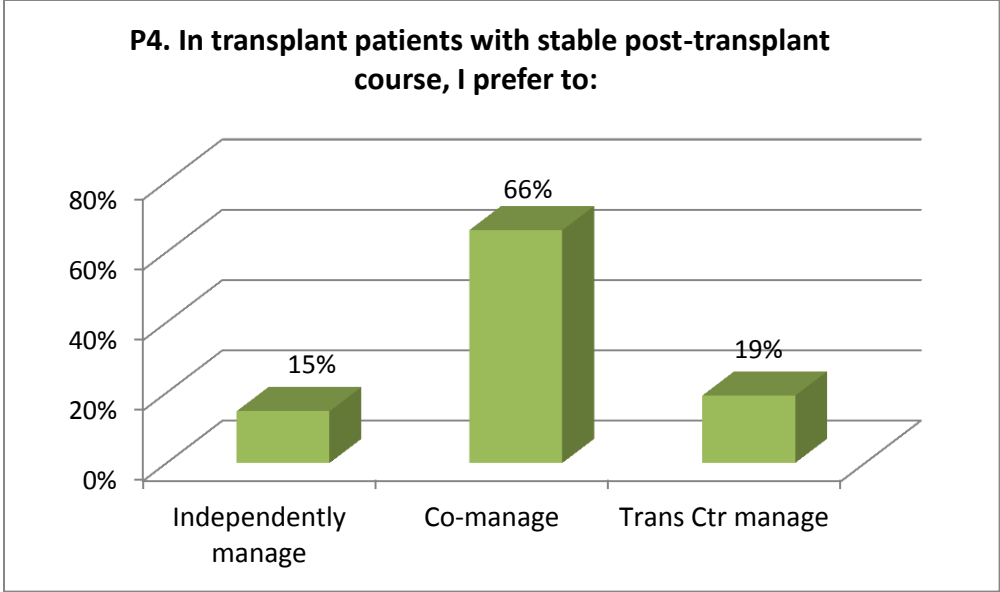


Figure 8: Community Nephrologist: Role in Post-Transplant Management

When asked to rate their responsibility in a variety of preventive care issues (P5, Figure 9), the responses of community nephrologists varied. They rated hypertension management highest, followed by lipid management; the lowest responsibility was that of dermatology issues, at 3.8 on the five-point scale.

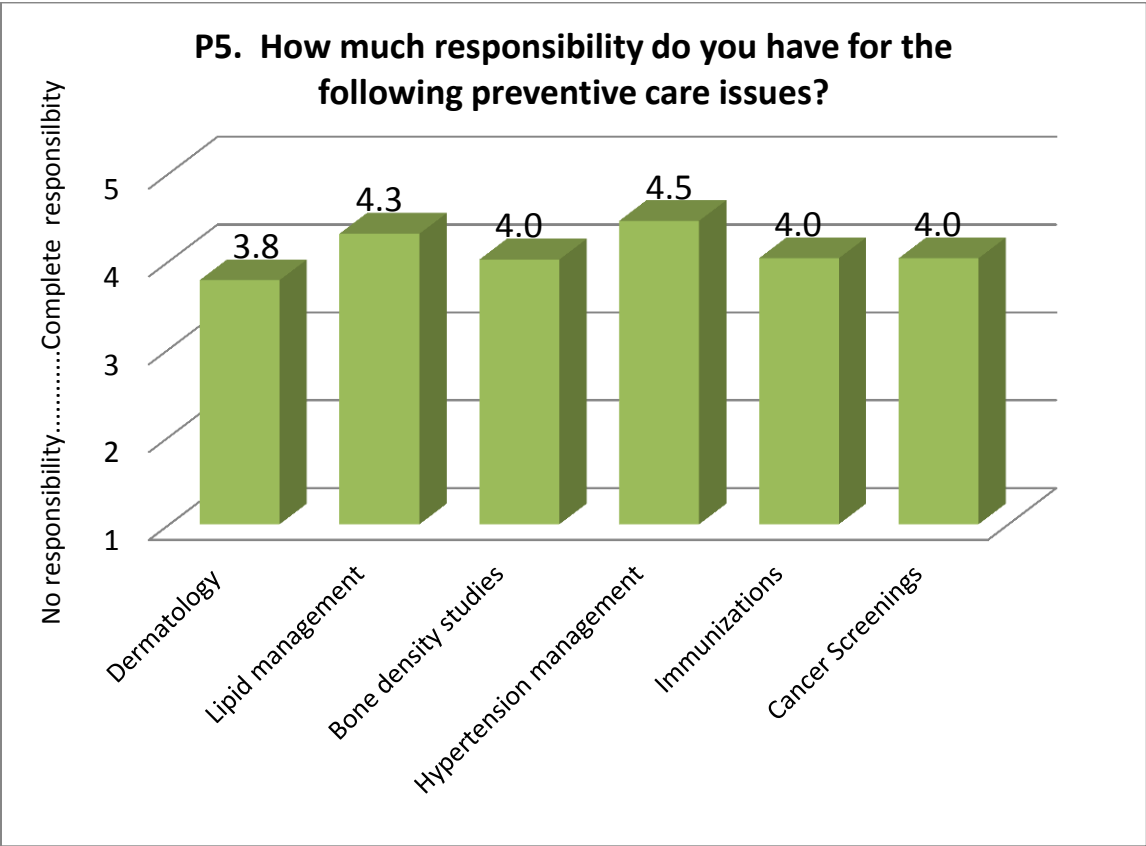


Figure 9: Community Nephrologist Preventive Care

Vaccinations are a fundamental part of the preventive care that is crucial to maintaining good health. They are particularly important with the transplant population due to immunosuppression. While most community nephrologists indicate that they administer influenza and pneumonia vaccines, fewer reported administering hepatitis B or Tdap (tetanus, diphtheria, and pertussis) vaccines (Figure 10).

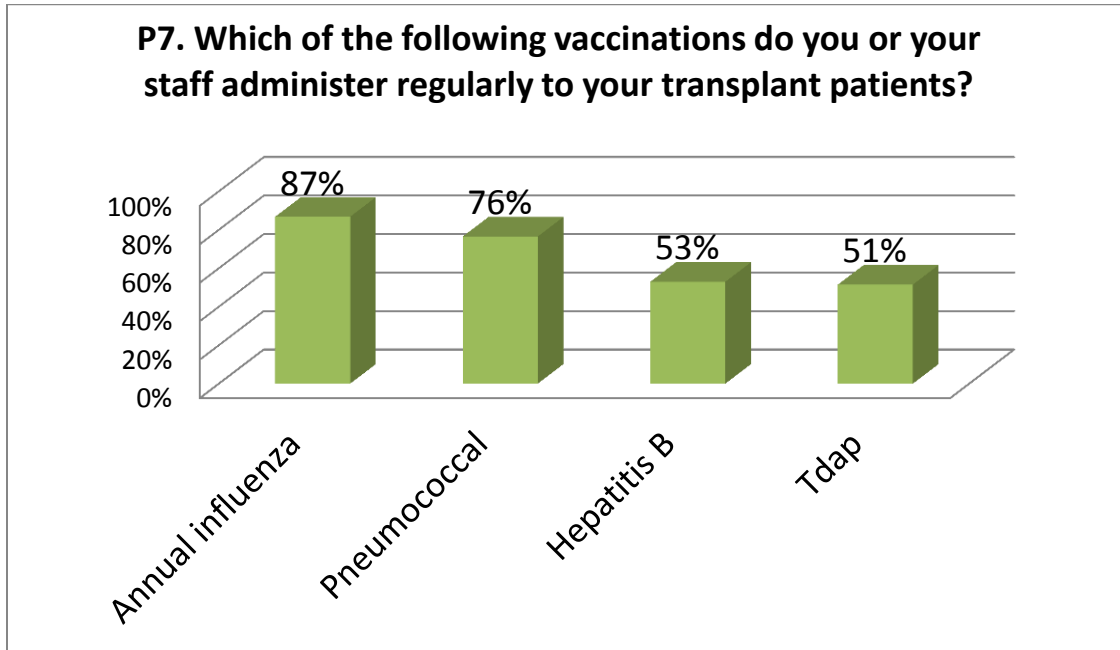


Figure 10: Community Nephrologist Regular Vaccinations

Because transplant recipients are at higher risk for bone disease, respondents were asked which monitoring methods they routinely use (P9). Although there were a variety of responses, most respondents use methods in accordance with existing guidelines (Figure 11).

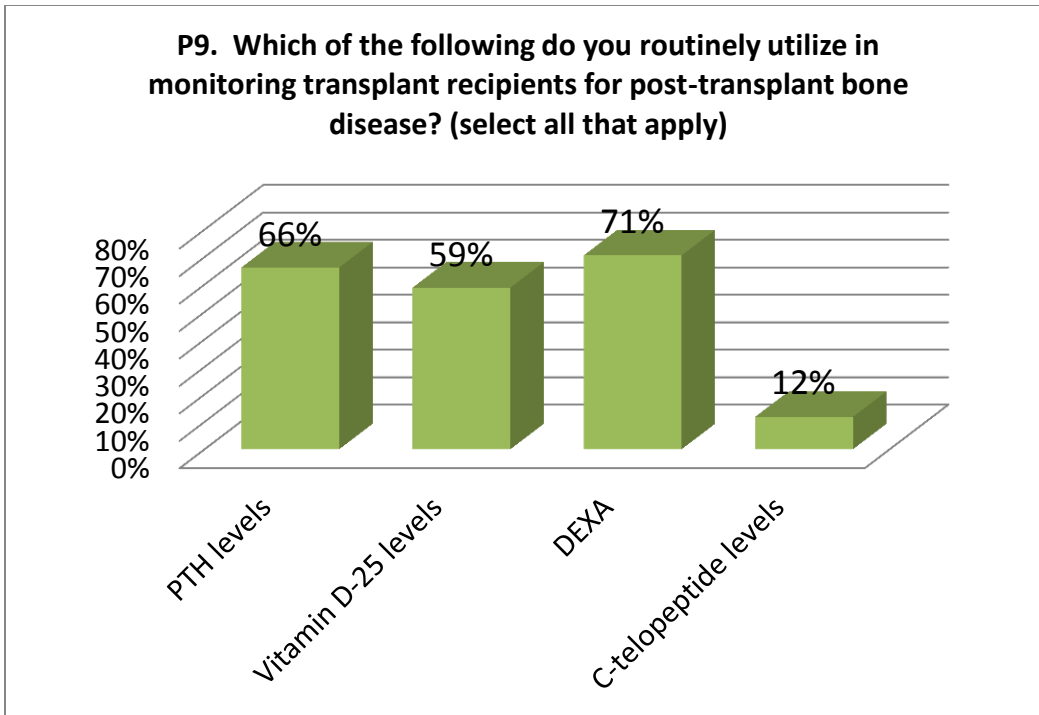


Figure 11: Community Nephrologist Bone Disease Monitoring

BK viremia is of particular concern in transplant patients and has been more prevalent in recent years. Although KDIGO recommendations call for monthly screenings for three to six months post-transplant and every three months afterward for the first year, only 21 percent of respondents follow this schedule (Figure 12). Forty-four percent follow a less rigorous schedule. Many of the 13 percent “other” responses were in compliance with or more rigorous than the recommended schedule.

P10. How often do you screen for BK viremia after kidney transplant?

1. Weekly for 4 weeks
2. Monthly for 3-6 months
3. Every 6 months indefinitely
4. Screen only if evidence of graft dysfunction present
5. Not applicable
6. Other (specify) _____

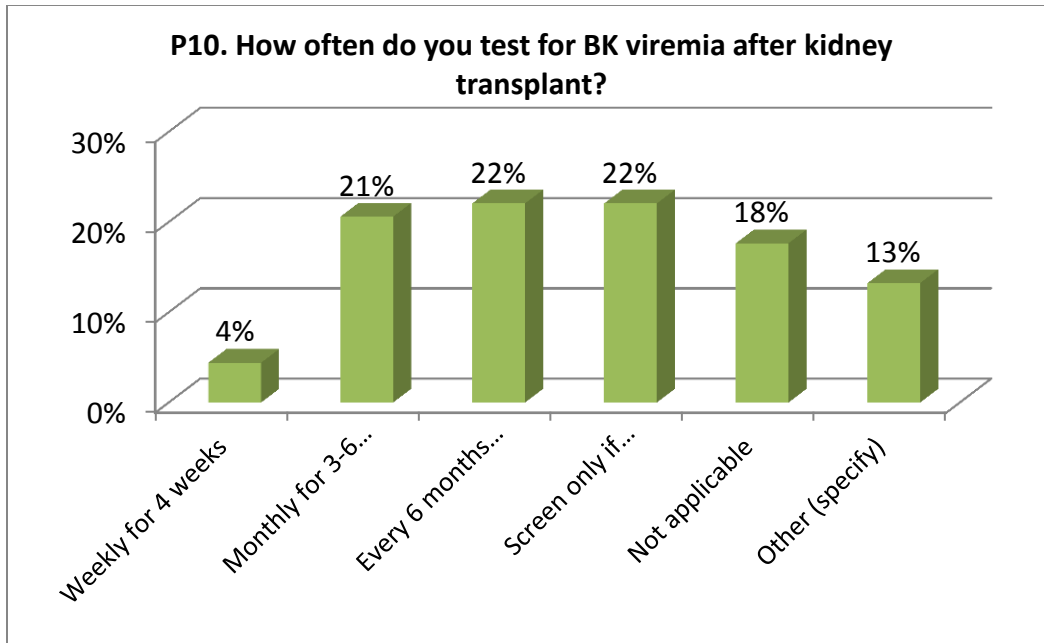


Figure 12: Community Nephrologist BK Viremia Testing

Educational Preferences

Survey respondents were asked a series of questions about their educational preferences. While it is important to consider their preferences in order to encourage participation in educational activities, educational preferences do not necessarily follow educational needs.

Community nephrologists were asked in which areas they believed the current body of knowledge and literature is inadequate to guide them in best practices (Figure 13). Only 15 percent feel that the current body of knowledge and literature is adequate. This is a perception that may represent a barrier to participation in continuing education and should be considered when planning and promoting continuing medical education and continuing professional development activities.

E4. In which of the following areas do you feel the current body of knowledge and literature is inadequate to guide you in the best care of the transplant patient. (check all that apply)

1. The current body of knowledge and literature is adequate to guide me in all of these areas.
2. Immunosuppression
3. Management of side effects
4. Co-morbid conditions
5. Drug interactions

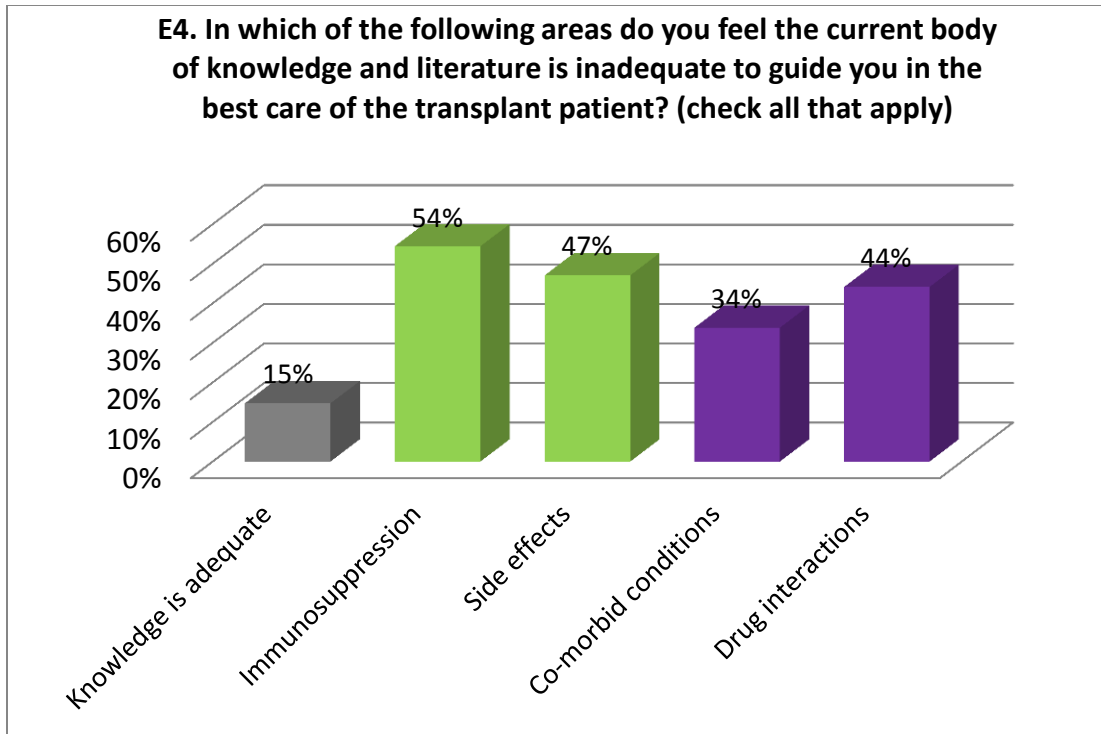


Figure 13: Community Nephrologist Knowledge and Literature (*Immunosuppression, Rejection, Chronic Disease, Adherence*)

Respondents were presented a list of topics related to management of kidney transplant patients and asked to indicate up to three areas of their most likely participation during their next continuing education activity (Figure 14).

E3. Please select up to three (3) topics you are most likely to select for your next CME activity.

1. Immunosuppression update
2. Drug-drug interactions in the kidney transplant patient with chronic disease such as hypertension and diabetes.
3. Managing adverse effects of immunosuppression
4. Appropriate monitoring of the kidney transplant patient
5. Titration of immunosuppression therapy
6. Managing chronic conditions such as hypertension and diabetes in the kidney transplant patient
7. Screenings and tools for preventive care in the transplant patient
8. Increasing adherence in the transplant patient
9. Other _____

The most frequently selected topics were:

- Immunosuppression update
- Appropriate monitoring of the kidney transplant patient
- Screenings and tools for preventive care in the transplant patient

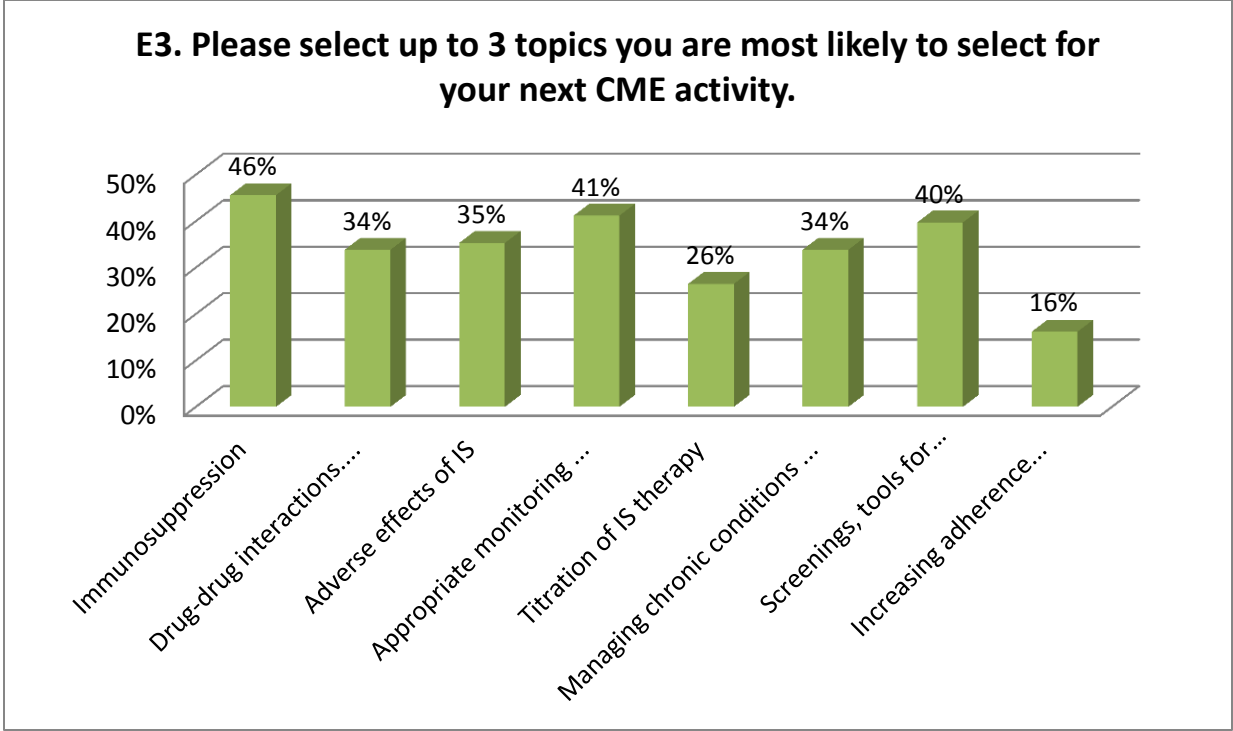


Figure 14: Community Nephrologist Topics for Next CME Activity

When asked to rate the importance of various attributes of educational activities, responses showed little difference between them (Figure 15).

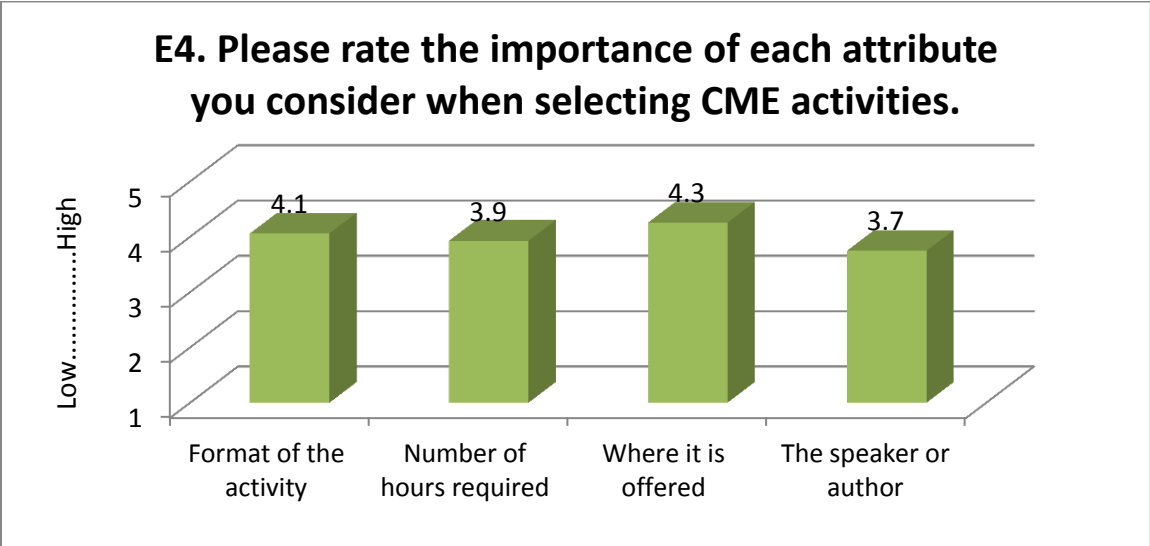


Figure 15: Community Nephrologist Attributes of CME Activities

The survey also queried learners about the format of their most recent educational activity (Figure 16). This provides a rough indication of the type of activity in which community nephrologists are most likely to participate. There was a broad distribution of responses; the highest single category is *web-based activities with no live component*, with 35 percent of the respondents indicating recent participation.

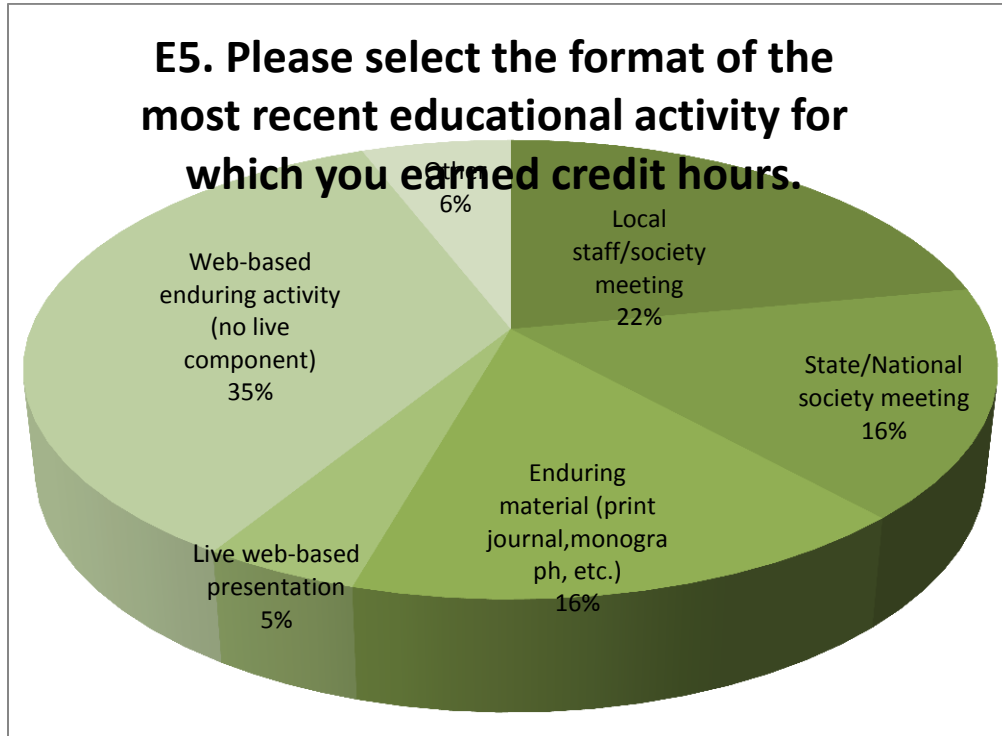


Figure 16: Community Nephrologist Format of Most Recent Educational Activity

Implications for Continuing Education

Table 4 summarizes the findings for community nephrologists in terms of each of the four assessment categories. Community nephrologists have high real and perceived needs in all areas. They also experience a number of barriers that prevent them from applying best practices to their care of transplant patients.

Topic	Perceived Need	Knowledge Gap	Practice Gaps	Barriers
Immunosuppression	All related competencies	Yes	Yes	PCP not adequately trained Cost of medications Adherence to regimen
Rejection	All related competencies	Yes	Yes	PCP not adequately trained Cost of medications Adherence to regimen
Chronic Care	All related competencies	Yes	No	Adherence to regimen Coordination of care Management of co-morbidities
Adherence	All related competencies	Yes	Yes	Cost of medications Adherence to regimen

Table 4: Community Nephrologist Summary Table (*Immunosuppression, Rejection, Chronic Disease, Adherence*)

Community nephrologists identified the item *Primary care physicians are not adequately trained to manage the complexity of a transplant patient* as a major barrier to patient care. This barrier stems from lack of subspecialists that are available to provide the long-term monitoring and chronic disease management that transplant patients require.

Immunosuppression

Community nephrologists identified the greatest area of real and perceived need surrounding immunosuppression. Eighty-five percent of community nephrologists report playing a role in managing immunosuppressive medication. Based on the interviews and focus groups, much of this barrier relates to the drug regimen: adjusting doses, monitoring for rejection, etc. Community nephrologists are not equipped to manage these issues, yet because of access or cost issues, they may be responsible for them. These findings are consistent with the topics that are most preferred by this group: immunosuppression updates and appropriate monitoring.

Education of the community nephrologist should emphasize the “basics” of current immunosuppressive therapy, the adverse effects of the drugs, common interactions with medications used to treat co-morbidities and chronic illnesses, and issues with generic substitution.

Rejection Risk Assessment and Monitoring

The educational need for appropriate rejection risk assessment and monitoring is closely related to the need in immunosuppression. For community nephrologists, items related to these areas (competencies, barriers, knowledge) were significantly correlated with each other ($r \geq 0.5$, $p \leq .05$).

Education for community nephrologists should include immunosuppression combined with focus on reducing the risk of rejection through assessment and appropriate monitoring. The second highest perceived need identified is *Identify risk factors for acute rejection*, while the second most commonly selected topic for medical education was *Appropriate monitoring of the kidney transplant patient*.

Chronic Care

Community nephrologists agree that they have a strong role in managing chronic care issues. They take the most responsibility for management of hypertension and lipids and feel responsible for the management of co-morbidities such as infection and bone disease. However, community nephrologists vary widely in the roles that they play with respect to chronic disease and co-morbidities in the transplant patient.

Community nephrologists feel that current literature and knowledge in chronic disease in the kidney transplant patient is inadequate. Admittedly, this is not a widely studied area; however, there are good evidence, guidelines, and consensus on best practices, of which community nephrologists may not be aware. Education should be focused on these areas and marketing efforts should emphasize new evidence and best practices.

Adherence

Allograft rejection is sometimes related to adherence issues. Perceived needs and barriers related to adherence were rated highly by community nephrologists as well as other specialists. All are aware of the role that adherence plays in the success of immunosuppression, organ rejection, and chronic care management. They report that adherence is closely linked to socioeconomic factors and recognize the unique adherence risks in young adult populations due to resistance and in the older populations due to confusion and the multiplicity of medications. Adherence should be addressed in all educational activities as a key factor in allograft survival. Tips and tricks to increase adherence should be part of the common curriculum of managing the transplant patient. This should include the identification of risk

factors for non-adherence, the communication of health risks to patients and caregivers, and the signs and symptoms of non-adherence.

The cost of care emerged as a key factor influencing patient adherence. Physicians in the community may not be well connected to resources that provide medications and care for those who cannot afford it. Some aspect of educational activities should focus on the identification and use of available resources so that they are accessible to community physicians as well as transplant centers.

Educational Attributes

Community nephrologists do not strongly favor any particular attribute of educational activities (format, venue, faculty, setting). When asked about their most recent educational activity, they showed an even distribution of formats and venues, with 38 percent participating in live local/state/ national activities and 35 percent participating in a web-based enduring activity. Educational activities should be implemented in a variety of formats and settings to attract the broadest interest and participation by community nephrologists, primary care physicians, and other clinicians who care for kidney transplant patients.

Appendix 1: Quantitative Assessment Tool

Thank you for your willingness to participate in this assessment. It should take you less than 10 minutes. This will help AST and other organizations to plan and implement effective medical education activities. Your responses to this survey are entirely confidential, and no personally identifiable information will be collected. Please click Continue to get started.

Practice Profile

D1. Please note your primary specialty:

Transplant surgery

- Transplant nephrology
- Community nephrology
- Other (please specify) _____

(Screening - terminate if no) Do you manage any post-transplant patients (kidney)?

- Yes
- No

D2. Approximately how many kidney transplant patients do you see in a typical week?

- 0 - 20
- 21 - 40
- 41 - 60
- More than 60

D4. Please select your type of practice

Solo

- Single specialty group
- Multi-specialty group
- Hospital transplant center
- Other _____

D5. How far away is the transplant center to which you refer the greatest number of patients?
less than 50 miles

- 51 - 100 miles
- 101 - 150 miles
- 151 - 200 miles
- More than 200 miles

D6. How many different transplant centers do you routinely refer patients to?

- 1
- 2
- 3 or more

Clinical Competencies

The next series of items represents clinical competencies related to management of the transplant patient. Please rate your Present Ability in the left-hand column, and your Desired Ability in the right-hand column.

Present Ability[Low,High]

	1	2	3	4	5
C1. Select an effective immunosuppressive drug regimen that attains adequate protection of the kidney allograft against rejection.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
C2. Minimize short- and long-term adverse side effects of immunosuppressive medications.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
C3. Identify potential interactions between immunosuppressive agents and other medications.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
C4. Identify risk factors for acute rejection.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
C5. Detect signs and symptoms of acute graft rejection by monitoring creatinine levels.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
C6. Attain an allograft biopsy to determine if rejection is occurring.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
C7. Coordinate with other specialists or primary care physicians to manage comorbid conditions (diabetes, hypertension, cardiovascular disease).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
C8. Use screenings to detect cancer in the transplant patient.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
C9. Monitor as appropriate for osteoporosis (calcium serum levels, phosphorus, bone-mineral density, and plasma intact PTH).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
C10. Mitigate risk of infection by appropriate use of prophylactic antibiotic, antiviral and antimycotic treatment.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
C11. Appropriately vaccinate 6 months post-transplant using inactive vaccines.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
C12. Identify risk-factors for non-adherence to medication regimens.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
C13. Effectively communicate risks of non-adherence to patients and family.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Barriers

The next set of statements represent barriers to best practices when managing transplant patients. Please rate each statement according your level of agreement as to whether the item represents a barrier to effective management of patients in pain.

Please indicate your level of agreement to the following statements: (1= strongly disagree, 5=strongly agree)

Barrier Questions (B1 – B12)	Strongly Disagree1	2	3	4	Strongly Agree5
B1. I do not always have access to the patient health information that I need to make the best decisions about patient management.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B2. Access to the transplant center is limited.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B3. I am not able to utilize the best therapies due to cost constraints.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B4. Many patients cannot afford the treatments that will keep them healthy.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B5. Patients are not honest with me about adherence to their treatments.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B6. Primary care physicians are not adequately trained to manage the complexity of a transplant patient.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B7. There is insufficient staff in our practice/facility to be able to support transplant patients as well as we should.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B8. There is too much of a delay between when a patient first shows elevated creatinine and when they return to the center for appropriate testing and management.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B9. Coordination of care for co-morbid conditions causes problems.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Practice Assessment

P1. Mrs. Jones received a kidney transplant 3 months ago and has returned to your clinic to establish follow-up. What would your role be in managing her immunosuppression? (select all that apply)

I play no role in immunosuppression.

- I monitor her immunosuppression and adjust dosages as needed to maintain the set targets.
- I change immunosuppression medications as needed.
- I let the patient decide between the community physician and the transplant center for managing immunosuppression.

A1.

	Very Uncomfortable 1	2	3	4	Very Comfortable 5
How comfortable are you in monitoring immunosuppression?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

P2. Ms. Smith is a 23-year-old African American female who received her second deceased donor kidney transplant for ESRD due to lupus nephritis 6 months ago. Her post-transplant course was complicated by one episode of acute cellular rejection. She is maintained on tacrolimus, mycophenolate mofetil and prednisone. She comes to you asking if she can stop the prednisone as she has heard of transplant recipients who are not taking it. How would you respond to her request?

- Contact the transplant center that performed the transplant to obtain their opinion
- Advise her to taper the prednisone by 1 mg per week until she is off completely
- Stop the prednisone given her young age and potential for long term complications of corticosteroid therapy.
- Advise her that she should stay on it given her medical history

P3. Please select any of the following that most often represents your practices related to renal allograft biopsies:

- I order renal allograft biopsies if there is concern for allograft dysfunction.
- I perform renal allograft biopsies myself.
- I confer with the transplant center that performed a patient’s transplant to decide whether or not to proceed with a kidney allograft biopsy.
- Other (specify) _____

P4. In transplant patients with a stable post-transplant course, I prefer :

- ... to independently manage care after they are released by the transplant center
- ... to co-manage with the transplant center indefinitely
- ... the transplant center to manage until they develop progressive graft failure requiring return to dialysis

P5. How much responsibility do you have for the following preventive care issues?

	No responsibility 1	2	3	4	Complete responsibility 5
Dermatology consultations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lipid management	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Bone density studies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hypertension management	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Immunizations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cancer Screenings: colonoscopy, mammogram, PSA, etc.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

P7. Which of the following vaccinations do you or your staff administer regularly to your transplant patients?

Annual influenza

- Pneumococcal
- Hepatitis B
- Tdap
- Other

P8. Please select up to 3 measures you rely on the most to monitor adherence to therapy. Select no more than 3 measures.

- Self-reported adherence
- Compliance with routine laboratory testing
- Blood medication levels
- Attendance at clinic visits
- Prescription refill records
- Other

P9. Which of the following do you routinely utilize in monitoring transplant recipients for post-transplant bone disease? (select all that apply)

- PTH levels
- Vitamin D-25 levels
- DEXA
- C-telopeptide levels

P10. How often do you screen for BK viremia after kidney transplant?

- Weekly for 4 weeks
- Monthly for 3-6 months
- Every 6 months indefinitely
- Screen only if evidence of graft dysfunction present
- Not applicable
- Other (specify) _____

Knowledge Assessment

K1. You are seeing a 36-year-old 8 months out from a deceased donor kidney transplant. You note that there is significant albuminuria. Which of the following medications could be contributing to this?

- Tacrolimus
- Cyclosporine
- Azathioprine
- Sirolimus

K2. Which of the following medications is most likely to contribute to a patient's dyslipidemia?

- Sirolimus
- Tacrolimus
- Mycophenolate Mofetil
- Belatacept

K3. Which of the following medications would preclude the use of allopurinol for hyperuricemia?

- Azathioprine
- Mycophenolate mofetil
- Cyclosporine
- Tacrolimus

K4. You would like to start a kidney transplant patient on clarithromycin. What will happen to the blood level of tacrolimus if the dose is not changed?

- The tacrolimus level will increase
- The tacrolimus level will decrease
- There will be no change
- Tacrolimus has to be stopped as it is contraindicated with clarithromycin

K5. A 68-year-old white male who received a kidney transplant from his wife 10 years ago for end stage renal disease due to polycystic kidney disease has had diarrhea for the past three days. He did not take his medications for two of those days. Presents to you feeling light headed. Blood pressure seated was 126/76, and on standing 90/55. Laboratories reveal a creatinine of 2.6 (baseline 1.5). What would you do?

- Give intravenous fluids and biopsy immediately to exclude rejection.
- Encourage oral fluid intake and biopsy immediately to exclude rejection.
- Give intravenous fluids and biopsy only if creatinine does not decrease the following day
- Proceed with a biopsy to exclude concomitant rejection even if the creatinine decreases the following day.
- Other (specify) _____

K6. John receives a kidney transplant and requires anti-hypertensive therapy post-transplant. Which of his pre-transplant anti-hypertensive medications would be expected to increase tacrolimus levels?

- Diltiazem
- Carvedilol
- Lisinopril

K7. Which of the following medications has the strongest association with the development of post-transplant diabetes?

- Sirolimus
- Tacrolimus
- Mycophenolate mofetil
- Cyclosporine

K8. Which is the leading cause of death in the transplant recipient?

- Malignancy
- Cardiovascular disease
- Infection
- Cerebrovascular disease

K9. For the kidney transplant recipient, what cancer has the risk most similar to the age- matched general population?

- Kidney
- Colon
- Non-melanoma skin
- Lymphoma

K10. Which is the correct virus-associated malignancy pair?

- BKV-bladder cancer
- HHV-6-Kaposi sarcoma
- EBV-Post transplant lymphoproliferative disease
- CMV-colon cancer

K11. The agent used for pneumocystis prophylaxis with the highest propensity for hemolytic anemia in select individuals is:

- Dapsone
- TMP/SMX
- Pentamidine
- Atovaquone

K12. Mark is a 65 year old male who wishes to update his immunizations. He asks if he should avoid any of the following. Which of the following would you tell him is/are UNSAFE? (select all that apply)

- Injected influenza
- Varicella zoster
- Tetanus
- Pneumovax

Educational Preferences

E1. Please select the format of the most recent educational activity for which you earned credit hours.

- Local staff/society meeting
- State/National society meeting
- Enduring material (print journal, monograph, etc.)
- Live web-based presentation
- Web-based enduring activity (no live component)
- Other

E2. Please rate the importance of each attribute you consider when selecting CME activities

	Not Important 1	2	3	4	Very Important 5
Format of the activity (presentation, interactive small group, live webinar, self-study, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Number of hours required to complete the activity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Where it is offered (on-line, local meeting, national meeting, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The speaker or author of the activity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

E3. Please select up to three (3) topics you are most likely to select for your next CME activity.

- Immunosuppression update
- Drug-drug interactions in the kidney transplant patient with chronic disease such as hypertension and diabetes.
- Managing adverse effects of immunosuppression
- Appropriate monitoring of the kidney transplant patient
- Titration of immunosuppression therapy
- Managing chronic conditions such as hypertension and diabetes in the kidney transplant patient
- Screenings and tools for preventive care in the transplant patient
- Increasing adherence in the transplant patient
- Other _____

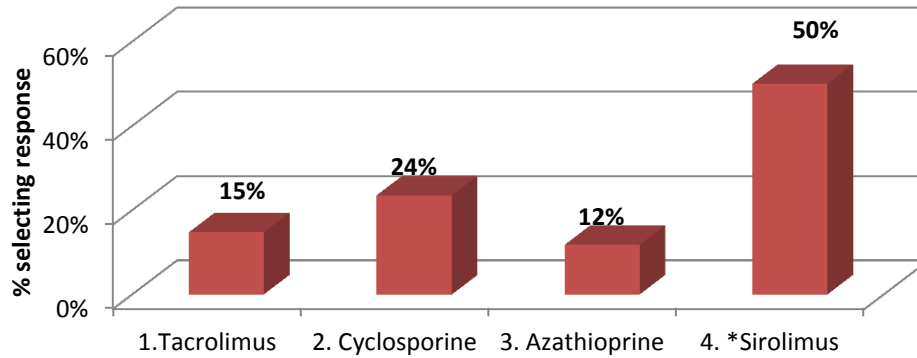
E4. In which of the following areas do you feel the current body of knowledge and literature is inadequate to guide you in the best care of the transplant patient. (check all that apply)

- The current body of knowledge and literature is adequate to guide me in all of these areas.
- Immunosuppression
- management of side effects
- co-morbid conditions
- drug interactions

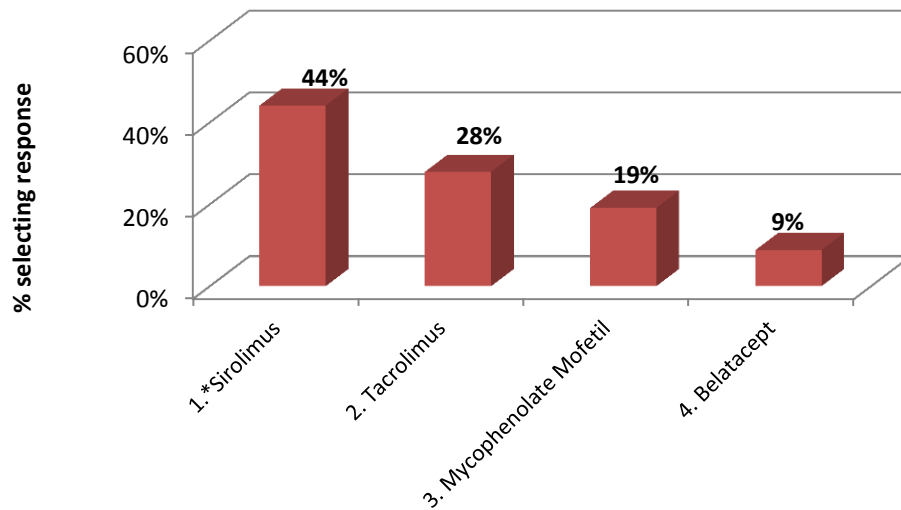
This completes the survey. Thank you for your participation. Please click on Submit below to record your responses.

Appendix 2: Additional Data Charts

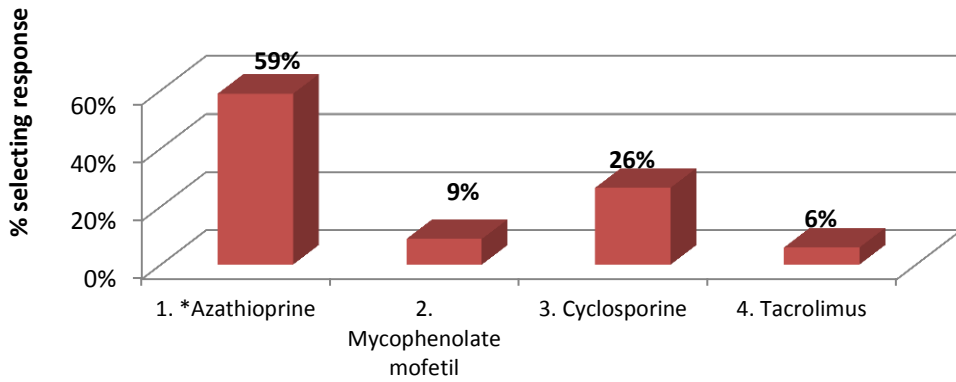
K1. You are seeing a 36-year-old 8 months out...You note that there is significant albuminuria. Which of the following medications could be contributing to this?



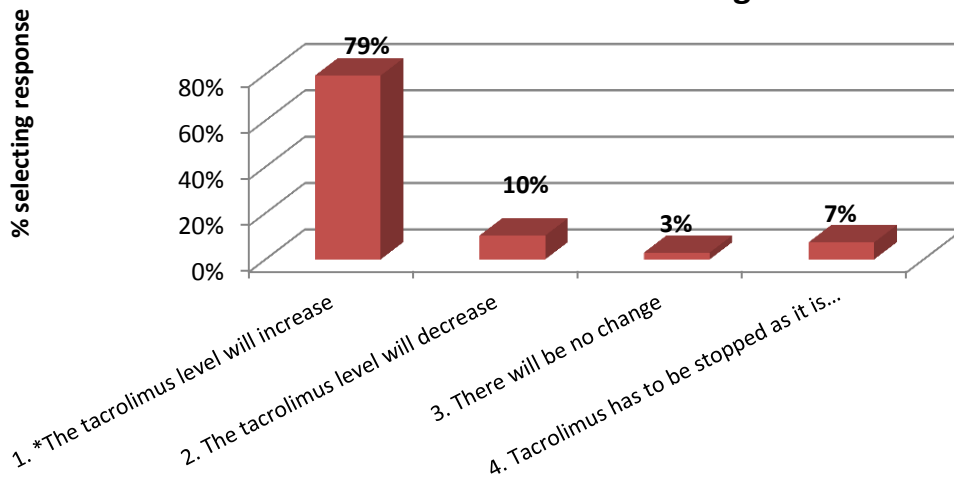
K2. Which of the following medications is most likely to contribute to a patient's dyslipidemia?



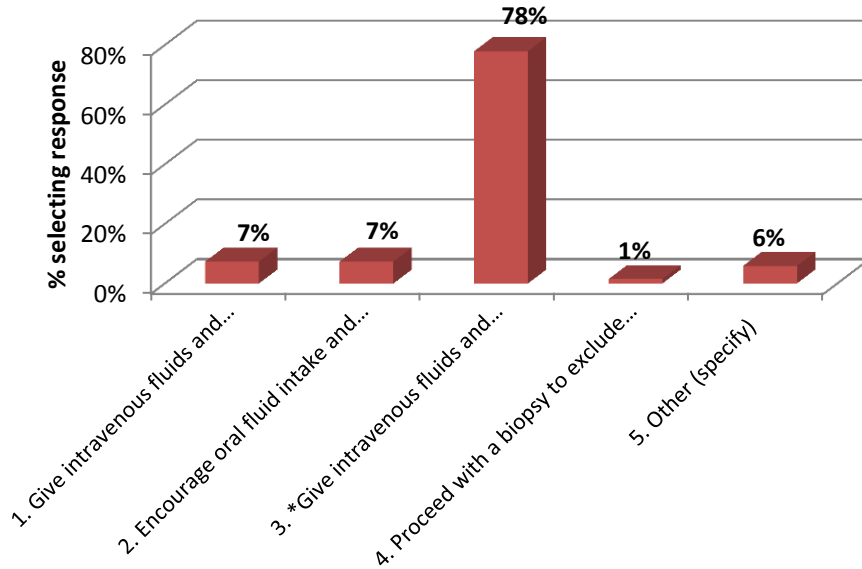
K3. Which of the following medications would preclude the use of allopurinol for hyperuricemia?



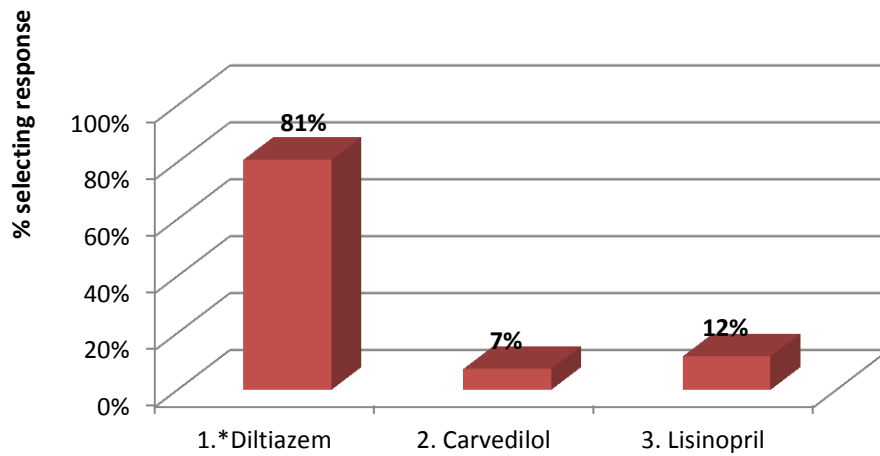
K4. You would like to start a kidney transplant patient on clarithromycin. What will happen to the blood level of tacrolimus if the dose is not changed?



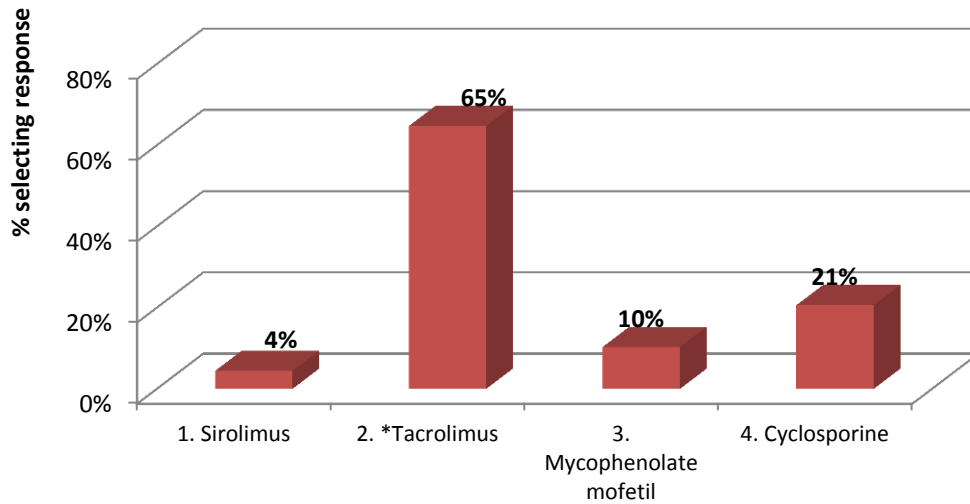
K5. A 68-year-old white male who received a kidney transplant from his wife...had diarrhea for the past three days. He did not take his medications for two of those days. Presents ... light headed. BP 126/76... Creatinine of 2.6 ... What would you do?



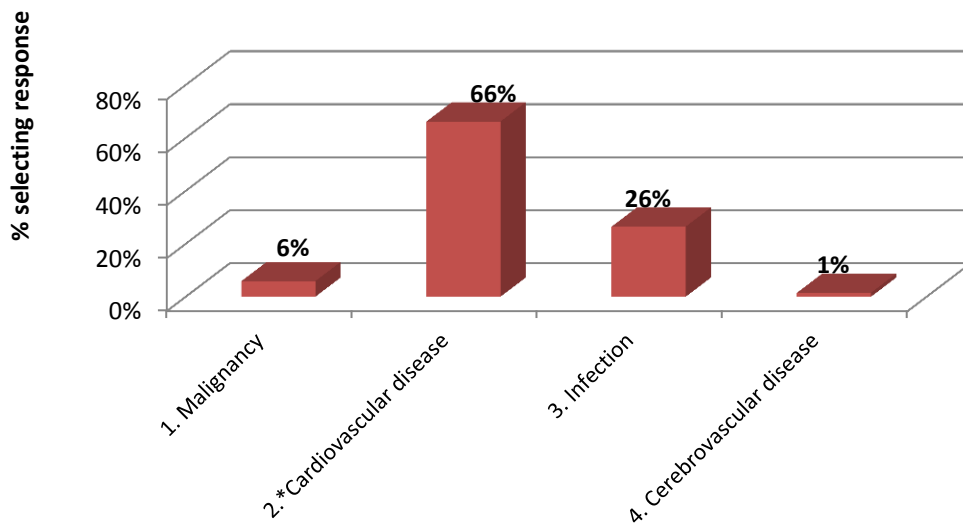
K6. John receives a kidney transplant and requires anti-hypertensive therapy post-transplant. Which of his pre-transplant anti-hypertensive medications would be expected to increase tacrolimus levels?



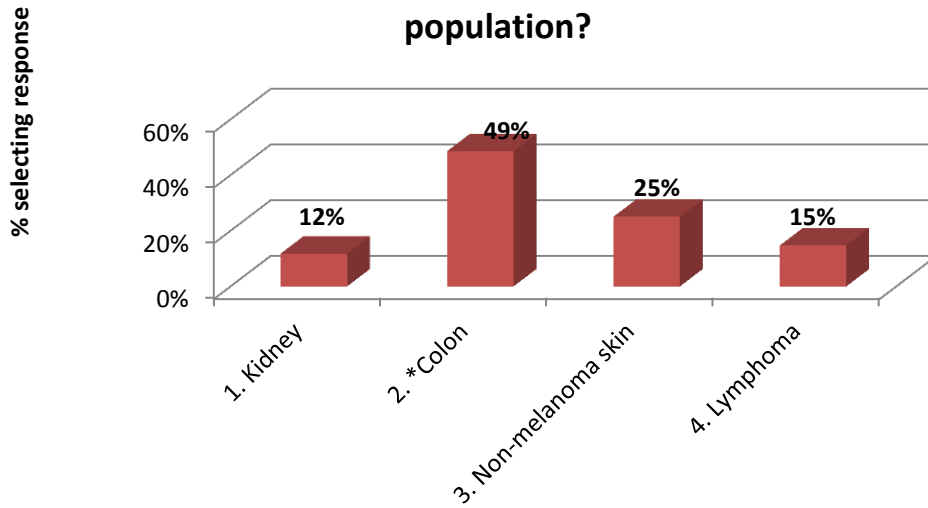
K7. Which of the following medications has the strongest association with the development of post-transplant diabetes?



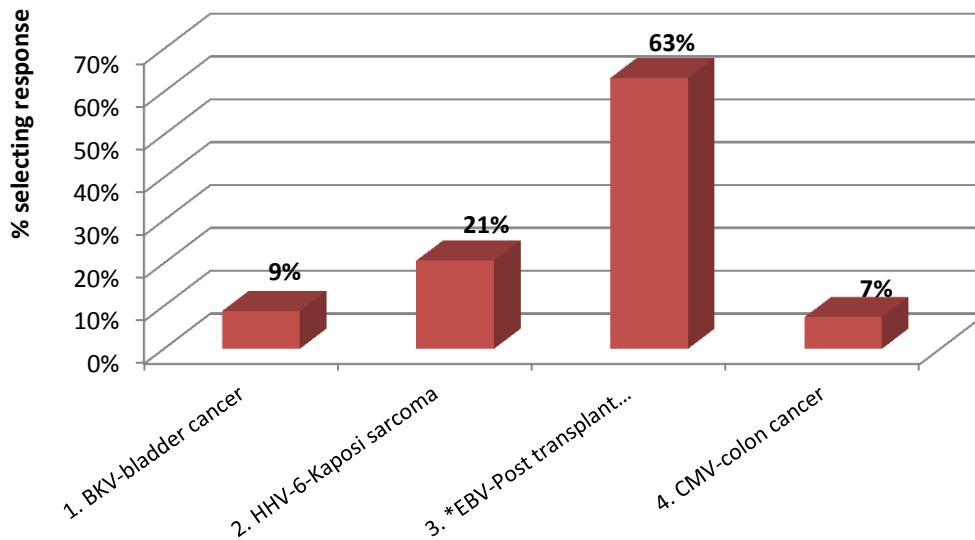
K8. Which is the leading cause of death in the transplant recipient?



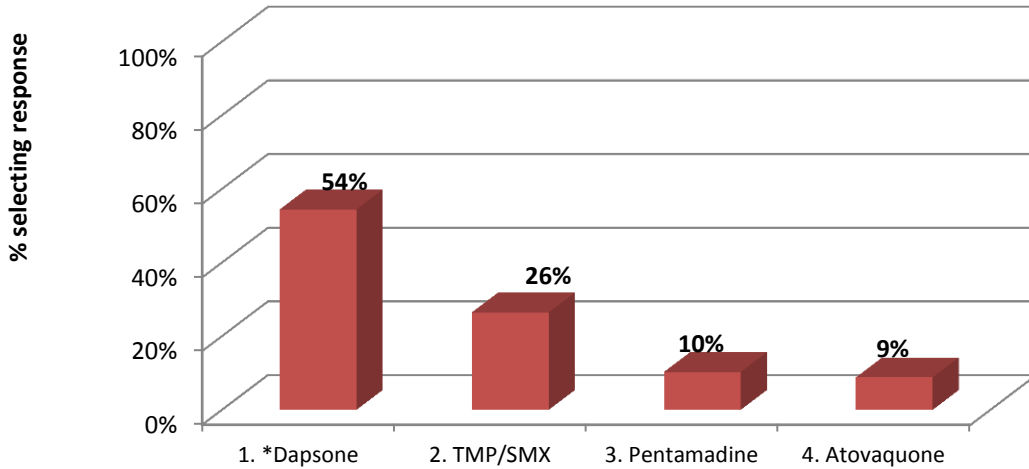
K9. For the kidney transplant recipient, what cancer has the risk most similar to the age- matched general population?



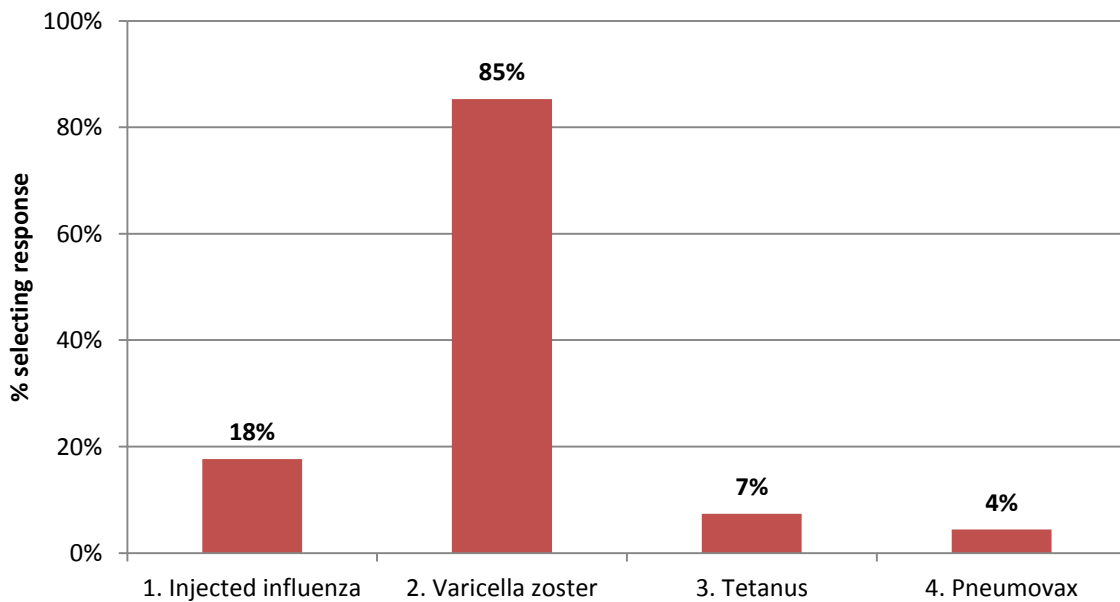
K10. Which is the correct virus-associated malignancy pair?



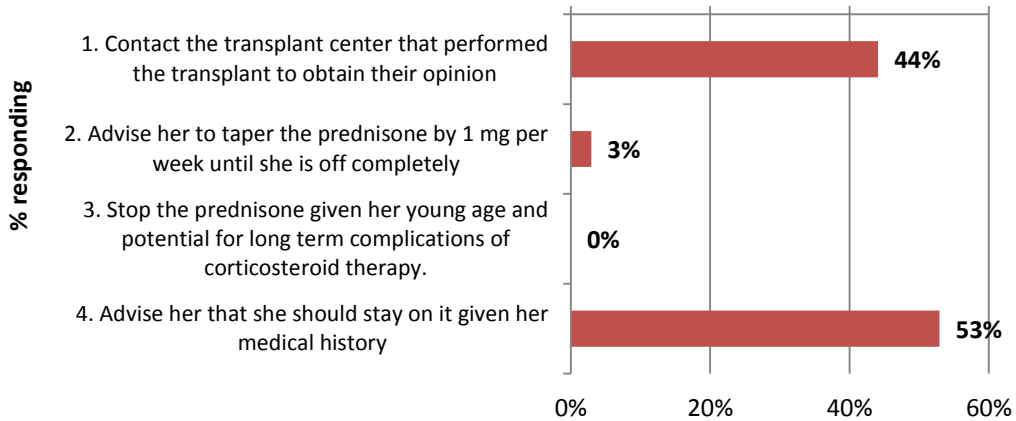
K11. The agent used for pneumocystis prophylaxis with the highest propensity for hemolytic anemia in select individuals is:



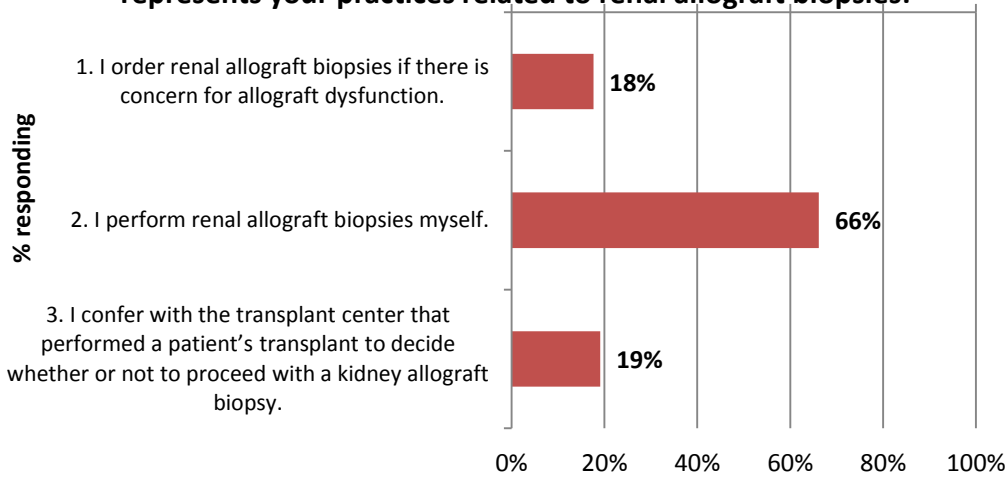
K12. Mark is a 65 year old male who wishes to update his immunizations. He asks if he should avoid any of the following. Which of the following would you tell him is/are UNSAFE? (select all that apply)



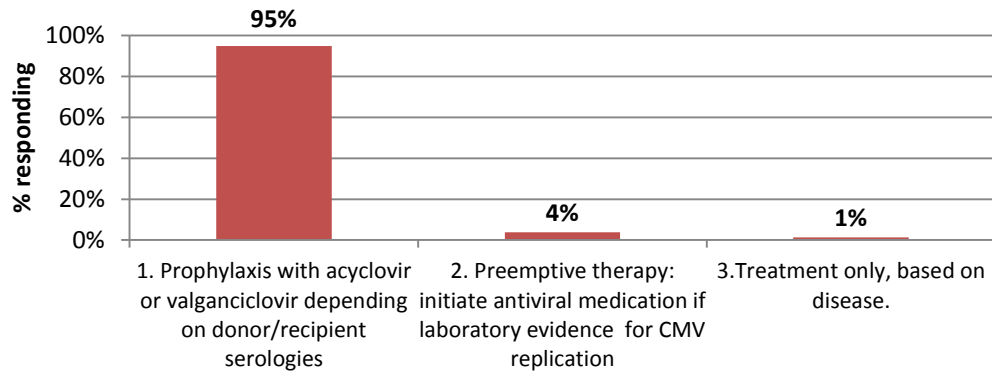
P2. Ms. Smith is a 23-year-old African American female who received her second deceased donor kidney ...asking if she can stop the prednisone... How would you respond to her request?



P3. Please select any of the following that most often represents your practices related to renal allograft biopsies:

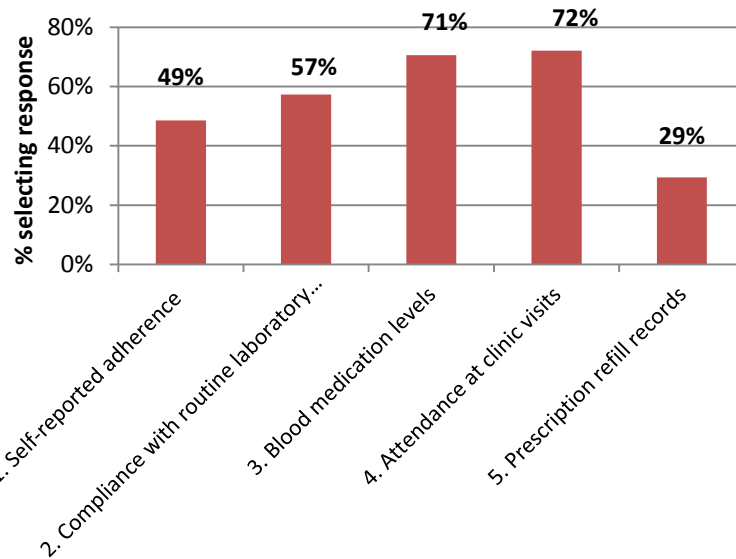


P6. (Transplant Specialists only) In your transplant recipients, which strategy is used for post-transplant CMV?



Transplant nephrologists' responses

P8. Please select up to 3 measures you rely on the most to monitor adherence...



Appendix 3: References

ⁱ CARI Guidelines. 2004; <http://www.cari.org.au/guidelines.php>. Accessed December 18, 2010.

ⁱⁱ KDOQI Guidelines and Commentaries. 2010;

http://www.kidney.org/professionals/kdoqi/guidelines_commentaries.cfm#guidelines.

Accessed December 18, 2010.

ⁱⁱⁱ KDIGO clinical practice guideline for the care of kidney transplant recipients. *Am J Transplant*. Nov 2009;9 Suppl 3:S1-155.

^{iv} Kälble T AA, Budde K, et al. *Guidelines on Renal Transplantation*: European Association of Urology;2009.

^v Immunosuppressive therapy for renal transplantation in adults. NICE Technology Appraisal No. 85, September 2004.

^{vi} European Best Practice Guidelines for Renal Transplantation (part 1). *Nephrol Dial Transplant*. 2000;15 Suppl 7:1-85.

^{vii} European best practice guidelines for renal transplantation: Part II. *Nephrol Dial Transplant*. 2002;17 Suppl 4.

^{viii} *United Kingdom Guidelines for Living Donor Kidney Transplantation*: The British Transplantation Society and the Renal Association;2000.