The one constant in solid organ transplantation (SOT), regardless of the organ transplanted, is the need for lifelong maintenance immunosuppression. However, the goal of preventing allograft rejection while minimizing drug toxicities has not been achieved and many SOT recipients are faced with graft loss and/or drug toxicities due to inadequate, inconsistent, or inappropriate immunosuppression regimens. Transplant clinicians along the entire continuum of patient care continue to grapple with this challenge of balancing the benefits with the risks of immunosuppression therapy. A study was conducted to determine if online educational interventions could improve knowledge, competence, and performance of nephrologists with respect to management of immunosuppression in SOT recipients.

METHODS

Based on the identified gaps in care, a series of 3 online continuing medical education interventions were developed that included an interactive, test-based review article (approximately 5000 words) and 2 case-based video discussions between 2 faculty (approximately 15 minutes each). All of the activities included interactive questions to engage the participants throughout the educational interventions. The effectiveness of educational interventions was evaluated with a cohort of 141 practicing nephrologists who participated in 1 or more of 3 online educational interventions using 2 different methodologies:

1. Interactive questions from the online interventions were grouped into 3 distinct domains of learning goals: selection of an immunosuppressive regimen, knowledge of new developments and practice recommendations, and ability to individualize therapy. Confidentiality of survey responses was maintained and responses were de-identified and aggregated prior to analysis. A comparison test was conducted on questions grouped by learning goals for the participant cohort to calculate the level of significance within each goal by comparing the percentage of correct vs incorrect responses. Cohen’s D formula was calculated to measure effect size of the questions within each learning goal.

2. Surveys were fielded to participants at the completion of each educational intervention. Responses to questions were collected from the participant cohort after completing the intervention. The survey was also fielded to a demographically similar control group of nonparticipants.

RESULTS

1. The correlation analysis of the sample of nephrologist participant responses (n=141) grouped by learning goals showed a positive and significant impact of online educational interventions within each group as follows:
   - Selection of appropriate immunosuppressive regimen (p=0.02; P=0.05)
   - Knowledge of new developments and practice recommendations (p=0.48; P=0.05)
   - Ability to individualize therapy (p=0.42; P=0.04)

2. In addition, significant improvements were also found when a sample of participant nephrologists’ (n=141) responses to knowledge- and case-based questions was compared with a demographically matched sample of nonparticipant nephrologists (n=141). For example, participants were more likely than nonparticipants to recognize that:
   - Calcineurin inhibitor (CNI)-based maintenance immunosuppression is associated with long-term nephrotoxicity, cardiovascular disease, metabolic syndrome, type 2 diabetes, infection, and malignancy (Figure 1)
   - A young donor, 0 human leukocyte antigen (HLA) match is the best candidate for induction with a nondepleting monoclonal antibody vs lymphocyte-depleting agent (Figure 2)
   - Screening for polyomavirus (BKV) in asymptomatic kidney transplant recipients.

3. A 58-year-old woman with end-stage renal disease (ESRD) from type 2 diabetes and a 3-year history of peritoneal dialysis (particularly nephrotoxicity) is accurate?

4. Which of the following statements regarding long-term toxicity in SOT recipients is NOT accurate? a. Chronic allograft nephropathy (CANG) contributes to an increased risk for basal cell cancer, melanoma, and Merkel’s cell cancer by chronic allograft nephropathy (CANG) (Figure 3).

5. A 62-year-old man presents to your office because he recently noticed some lesions on his ear and forehead, which have been getting larger. He is status post his kidney transplant 1 year ago and was induced with rabbit antithymocyte globulin (rATG) and maintained with tacrolimus (TAC), mycophenolic acid (MPA) and prednisone. One month later, his serum creatinine level is 1.1 mg/dL. Between 3 and 4 months post-transplantation, his serum creatinine rises from normal to 2.1 mg/dL. Screening for polyomavirus (BKV) in asymptomatic kidney transplant recipients. Effectiveness of these interventions is associated with renal transplantation are at increased risk for basal cell cancer, melanoma, and Merkel’s cell cancer (85% participant vs 88% control, P=0.05).

CONCLUSIONS

This study demonstrated the effectiveness of an online curriculum of educational interventions consisting of 2 different educational formats, text-based with interactivity and case-based video, on improving the practice patterns of nephrologists in the management of SOT recipients. Effectiveness of these interventions was particularly noted in the ability to select appropriate immunosuppressive therapy, individualizing therapy in patients with skin cancer and BKV infection, and identifying practice recommendations based on key developments in SOT. Statistically significant improvements in several domains of SOT management as a result of participation in online educational interventions specifically designed to address gaps in care may result in improvements in patient care and outcomes.

Success of Online Educational Interventions on Management of Immunosuppression in Solid Organ Transplantation

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Purpose

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