Background: Calcineurin inhibitors (CI) such as cyclosporine A (CsA) and tacrolimus often cause renal dysfunction resulting in an increase in serum creatinine (Cr), hyperkalemia, hypomagenesemia, and hyperuricemia. Electrolyte and uric acid abnormalities are considered mainly due to renal tubular impairment. However, the effects of CI on the sodium regulation have yet to be fully evaluated. In the present study, we have quantitatively evaluated the effects of CI on urinary sodium excretion in patients receiving tarolimus or CsA in the early period after allogenetic hematopoietic stem cell transplantation (HSCT).
Patients and Methods: One hundred recipients of allogeneic HSCT receiving CI (CsA, n=50; tacrolimus, n=50) with the available weekly data for calculating fractional excretion of sodium (FENa) for 4-week period after transplantation were enrolled. No significant differences were observed in patient characteristics except for the type of donor between CsA and tarolimus groups. FENa was calculated according to the following formula: 100 x (Urinary sodium x Serum Cr)/(Serum sodium x Urinary Cr).
Results: Both CsA and tarolimus groups showed increase in FENa at 2nd to 4th weeks after transplantation as compared with those at 1st week (0.96±0.44 for CsA; 0.92±0.49 for tacrolimus). Among them, a significant increase was only observed at 3rd and 4th weeks in tacrolimus group, but not in CsA group. In addition, FENa was significantly higher at 4th week in tacrolimus group as compared with CsA group (1.60±1.12 vs. 1.13±0.80 :$p<0.05$).
Conclusion: These results suggest that urinary sodium excretion increases under the administration of CI after allogeneic HSCT probably through renal tubular impairment and that there is a significant difference in the renal tubular toxicity between tacrolimus and CsA.

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Antibiotic Prophylaxis Therapy for Pediatric Patients Undergoing Hematopoietic Stem Cell Transplant (HSCT): A Tale of 2 Centers

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Introduction: Bacterial infections are a leading cause of morbidity and treatment-related mortality in children following hematopoietic stem cell transplant (HSCT). Meta-analysis of studies of bacterial prophylaxis in adult oncology patients with neutropenia showed a significantly decreased risk of death associated with prophylaxis regimens. However, the use of prophylaxis vs. empiric treatment is controversial in the setting of HSCT and data in children is limited. The concerns for using prophylaxis therapy are development of antibiotic resistance and increased drug-related toxicity. An empiric approach to antibiotic therapy prompts the concern that therapy is delayed until an infection has already occurred. Our study aimed to compare the bacteremia rates in two pediatric centers that use contrasting approaches; empiric vs. prophylaxis.
Methods: We compared the incidence of bacterial infections in pediatric HSCT patients in two units; The Hospital for Sick Children (SickKids) where an empiric antibiotic strategy is utilized and Vanderbilt University Medical Center, where prophylaxis antibiotic (Cefipime) is given when ANC<500/ul or on the day of transplant, which ever is earlier. Baseline characteristics were compared between the 2 groups with 2 sample tests, where categorical variables and continuous variables were evaluated using double-sided Fisher exact tests respectively.
Results: 224 pediatric patients from SickKids and 294 pediatric patients from Vanderbilt who underwent autologous and allogeneic HSCTs between 2005-2010 were evaluated. Total bacteremia rate (Gram positive and Gram negative) was significantly higher at SickKids (68/224) vs. Vanderbilt (49/294), p<0.001). At SickKids, 19% presented with Gram positive infection as their first infection at a mean of 8.9 d after transplant and 11% with gram negative infection at a mean of 4.0 d after transplant.At Vanderbilt, 14% presented with gram positive infection at a mean of 9.5 d after transplant and 2% with gram negative infection at a mean of 5.2 d after transplant. No treatment-related mortality in the first 100 days was attributed to bacterial infections in either center. Using a multivariable model including: age, diagnosis (malignant vs. non-malignant) and type of transplant (allogeneic vs. autologous), only antibiotic prophylaxis approach resulted in a significantly lower gram negative bacteremia (p=<0.001) and a trend toward lower incidence of gram positive bacteremia (p=0.052).

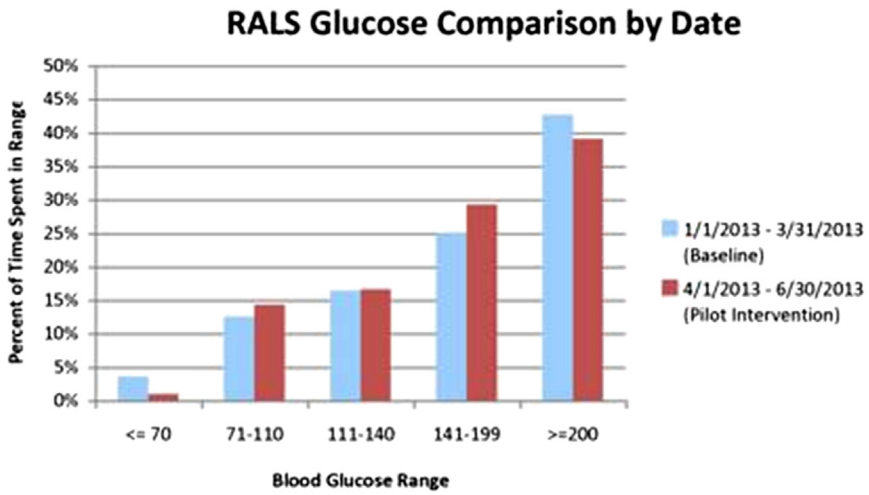

Figure 1.

Conclusions: The use of antibiotic prophylaxis in pediatric HSCT decreased the incidence of bacteremia during transplant. The use of antibacterial prophylaxis in pediatric patients undergoing HSCT should be considered, and prospective studies are needed to confirm our results.

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Improvement of Blood Glucose Control on the Bone Marrow Transplant (BMT) Unit: A Retrospective Review of Our Quality Improvement Pilot Program

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Background: Multiple studies of improved glycemic control in critically ill patients have yielded contradictory results. Few studies on inpatient hyperglycemia exist in the BMT population. We undertook a quality improvement project to improve blood glucose (BG) control with a goal of increasing the proportion of time that patients on our BMT service spent within the range of 70-200 mg/dl.

Methods: With the Division of Endocrinology, an algorithm for the initiation and modification of finger sticks and antihyperglycemic medications was created and implemented on the Tufts Medical Center BMT service for admissions between 4/1-6/30/13 that were predicted to be > 48 hours in duration (intervention). Using the Remote Automated Laboratory System (RALS), the percent of time in each BG range (<70, 71-110, 111-140, 141-199, >200) was calculated for the entire floor in the three months prior to implementation(baseline) and during the three months of the pilot program. As the oncology service is included in this calculation and was not part of our intervention, admissions were analyzed for comparison. With IRB approval, retrospective data of admissions >48 hours was collected to evaluate BG, length of stay, and infectious complications.

Results: The baseline cohort included 64 BMT admissions, while there were 70 BMT admissions in the intervention cohort and 102 oncology admissions not part of the intervention. 14% of patients in each of the three admission groups had a history of diabetes. 30% of all patients on BMT were discharged on steroids, compared to 10% on oncology. On admissions when finger stick evaluation of BG was initiated (36% in the BMT intervention cohort, 25% in the BMT baseline corhort, ($P = 0.25$), more patients received short acting insulin as per the algorithm (21% vs 6%, $P = 0.016$), but there was no difference in the number transitioned to long acting insulin. In the intervention cohort, the proportion of time spent in the BG range of 71-199 increased, with less time spent with a BG < 70 or > 200 (Figure 1, $P < 0.0001$). Fewer BMT patients were hyperglycemic within 48 hours of a documented infection in the intervention group compared to the baseline cohort, but the overall rate of infection among the three groups was low. Within each cohort on BMT, 6 admissions had a discharge BG>200, and 3 were discharged on new anti-hyperglycemic medications.

Conclusions: We were able to demonstrate the feasibility of implementing a program to control and track blood glucose. Not only were we able to limit hypoglycemic episodes, there was a lower rate during the intervention compared to baseline. The results of this retrospective study will allow the design of larger trials to determine whether BG control has an impact on length of stay, infectious complications, and mortality.

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Retrospective Analysis of Oral Versus Intravenous Tacrolimus in Patients Undergoing Allogeneic Hematopoietic Stem Cell Transplantation

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