the 32 patients (63%) who did not require PICU admission had a BNP level > 100 during that time frame (Odds ratio 10.8, 95% CI (1.3 – 91.5)). Six patients (12%) died due to transplant related mortality in the first 100 days; 5 of these (83%) had a BNP level >100 during the first 14 days.
Conclusions: BNP levels peaked at Day +14 after allogeneic HSCT in this study. Children who required critical care resources (oxygen and PICU admission) almost invariably demonstrated an elevated BNP during the first 14 days after HSCT. This information may be useful clinically and for risk stratification in studies of pediatric HSCT patients. The etiology of the rise in BNP requires further study.

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Research qPCR Method for Engraftment Monitoring: A 6-Year Review of Proficiency Testing Results

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A total of 40 samples were tested from 11 proficiency surveys from 2006 through 2012 using samples from the American Society for Histocompatibility and Immunogenetics (ASHI) and the Post-SCT Chimerism Monitoring Programme of the United Kingdom National External Quality Assessment Schemes (UK NEQAS) for Leucocyte Immunophenotyping.
Sample percentage breakdown by reported means for the 39 ASHI samples is as follows: 3 did not consist of target cells (0% samples), 5 consisted of target percentages from 5.7 to 22.28%, 8 consisted of target percentages from 26.2 to 49.2%, 20 consisted of target percentages from 51.2 to 95.93%, and 3 consisted only of target cells (100% samples). The single UK NEQAS sample reported a median percentage of 94.70%. Thirty-two of the forty samples (80%) consisted of target percentages above 25%.
All 40 samples tested to date have received passing results with our research qPCR method. For the three 0% samples from 3 separate surveys, our qPCR method gave a result of 0% for each sample while the STR PCR method gave a result other than 0% in 14 instances. For the three 100% samples from 3 separate surveys, our qPCR method gave a result of 100% for each sample while the STR PCR method gave a result other than 100% in 10 instances.
It is not until recently (2012), that more than 1 or 2 testing sites in the ASHI proficiency testing program have used a qPCR method. The last ASHI survey of 2012 and the first and current UK NEQAS trial of the 2012-2013 schedule both included 4 sites using qPCR. The qPCR method is a valuable tool capable of studying chimerism far below the levels attained by STR PCR (e.g. microchimerism < 1%). As the number of sites using qPCR potentially increases, proficiency testing organizations should include lower percentage samples in order to adequately test the lower sensitivities attainable with the qPCR method.
While ASHI participation began in 2006, it was not until 2010 that specific mention of our qPCR approach appeared in the summary report. In the latest ASHI survey (2012 EMO-2), it was recognized in the summary report that both conventional (STR PCR) and qPCR assays can be used successfully based on the comparable performance of the methods. Six years of proficiency testing participation lends concrete evidence that our research qPCR method is a viable alternative to the STR PCR approach offering unmatched sensitivity while maintaining high accuracy and reproducibility with low to high percentage samples.

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Prompt Treatment of Respiratory Syncytial Virus with Inhaled Ribavirin and IVIG in High Risk Allogeneic Stem Cell Transplant Recipients Significantly Diminishes Mortality

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Background: Respiratory syncytial virus (RSV) is a potentially life threatening infection in allogeneic stem cell transplant (Allo) recipients. Viral respiratory tract infections have also been implicated in bronchiolitis obliterans (BO) and other post Allo non-infectious pulmonary complications (NIPCs). Since 2000, we have treated RSV infections in Allo patients (pts) in a standardized manner with pre-established criteria. We sought to determine survival of such uniformly treated pts and to ascertain their risk of subsequent NIPCs.
Methods: Allo pts were systematically tested for RSV if they presented with evidence of lower respiratory tract infection or upper respiratory tract symptoms and predefined risk factors for RSV pneumonia. Pts received inhaled ribavirin 2 g q8h × 15 doses and standard IVIG 500 mg/kg/day × 4 days (d) if they exhibited any of the following features: 1) neutropenia, 2) pneumonia, 3) active treatment for GVHD. Data from 1/00 to 6/12 were collected retrospectively and analysed on an "intent-to-treat" basis.
Results: We present the first 32 pts; their characteristics are shown in Table 1. Of those with RSV pneumonia, one died 17 d after diagnosis (case fatality rate 6.3%; 95%CI: 0.2-30.2%) after receiving partial treatment in the context of palliative care for relapsed leukemia. In total, 13 pts died (40.6%; 95% CI: 23.7-59.4%). Causes of death other than RSV included GVHD (n=4), relapse (n=5), fungal and bacterial pneumonia (n=2), ARDS (n=1) and other (n=1). Median OS from RSV infection was 53 months (m) (95%CI: 22 m-not reached). Four pts had been diagnosed with BO 9 to 251 d prior to RSV. Among the 28 at risk for developing BO, the incidence was 0% (95%CI: 0-12.3%). One was diagnosed with cryptogenic organizing pneumonia 36 d after RSV (3.4%; 95%CI: 0-18.3%).

Table 1
Patient Characteristics (n=32)

Characteristic	N (%)
Median age (range)	48 (20-62)
Diagnosis	
AML/ALL/MDS/CML	3/5/7/3
CLL/NHL/Myeloma	2/6/4
Other	2
Donor source	
Matched sibling	15 (47)
Matched unrelated	13 (41)
Mismatched unrelated / haploidentical / cord blood	4 (12)
Conditioning regimen	
Myeloablative	19 (59)
Reduced intensity	13 (41)
Acute GVHD	14 (44)
Chronic GVHD	27 (84)
Patients on ≥2 immunosuppressors at RSV diagnosis	21 (66)
Clinical syndrome	
Upper tract infection	16 (50)
Pneumonia	16 (50)
Median days from transplant to RSV infection (interquartile range)	382 (241 to 1049)

Conclusion: We observed an extremely low RSV pneumonia fatality rate in contrast to that reported in the literature. Perhaps due to strict control of nosocomial transmission, our cohort tended to contract RSV late, which might account for better outcomes. Our low incidence of NIPCs is intriguing, and could be biased by the fact that 66% of our cohort was on $\geq$ 2 immunosuppressors. Our findings support prompt treatment of high-risk patients with inhaled ribavirin/IVIG to diminish early RSV-related mortality and morbidity.

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Incidence of Post-Transplant Bacterial Foodborne Pathogens in Hematopoietic Stem Cell Transplant Patients

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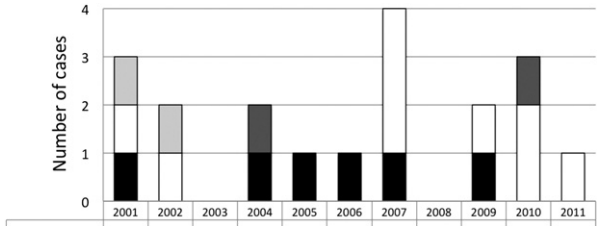
Background: Diarrhea, abdominal pain and fever are common among patients undergoing hematopoietic stem cell transplant (HCT), but such symptoms are also typical with foodborne infections. The burden of disease caused by foodborne infections in patients undergoing HCT is unknown. We sought to describe the incidence of post-transplant bacterial foodborne infections in a single-center population of HCT recipients.

Methods: We reviewed all patients who received a HCT at the Fred Hutchinson Cancer Research Center in Seattle, WA from 2001 to 2011. Data were collected retrospectively using center databases, which include information from transplant, on-site examinations, outside records, and collected laboratory data. Patients were considered to have a bacterial foodborne illness if Campylobacter jejuni/coli, Salmonella, Shigella, Yersinia or Listeria species were isolated in culture; patients with evidence of non-foodborne origin for infection were excluded. All post-transplant events were classified as early ($\leq$ 100 days post-transplant) or late (>100 days).

Results: A total of 18/4404 (0.4%) patients developed a post-transplant bacterial foodborne illness (Figure 1). Patients had a mean age at infection of 45.8 years (range 1 − 68), and the majority were adults $\geq$18 years of age (n=14 [78%]) and male gender (n=13, [72%]). Most cases occurred in patients who had undergone an allogeneic transplant (n=12 [67%]). These infectious episodes occurred at a median of 87.5 days after transplant (IQR 19, 367). The overall incidence rate post-transplant was 0.34 per 100,000 patient days, and 1.9 per 100,000 in the early post-transplant period. Bacterial foodborne infections occurred evenly between the early and late periods (n=9 early, n=9 late). The most frequent pathogen detected was Campylobacter (n=9 [50 %]) followed by Salmonella (n=5 [28%]), Yersinia (n=2 [11%]) and Listeria (n=2 [11%]); no cases of Shigella were detected. Diagnoses were made in most patients through positive stool cultures (n=13 [72%]), while a smaller proportion were first positive through blood cultures (n=4 [22%]); one patient was positive simultaneously at both sites. Mortality due to bacterial foodborne illness was not observed during follow-up.

Conclusions: Our large single-center study indicates that bacterial foodborne infections were a rare complication following HCT. These data provide important baseline incidence for future studies evaluating dietary interventions in HCT patients.



	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Yersinia	1	1	0	0	0	0	0	0	0	0	0
Listeria	0	0	0	1	0	0	0	0	0	1	0
Campylobacter	1	1	0	0	0	0	3	0	1	2	1
Salmonella	1	0	0	1	1	1	1	0	1	0	0

No cases of Shigella were reported.

Figure 1. Bacterial foodborne infections among post-transplant HCT patients by year

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Tolerability of Daily Micafungin Antifungal Prophylaxis in High Risk Pediatric Patients Undergoing Hematopoietic Cell Transplantation for Non-Malignant Disorders

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Objective: Invasive fungal infections are a cause of mortality in pediatric allogeneic hematopoietic cell transplantation (allo-HCT) recipients. Prophylaxis with triazoles present a challenge in patients with non-malignant disorders due to pre-HCT risk for organ dysfunction. Micafungin is an echinocandin with activity against *Candida* and *Aspergillus* species. Limited toxicity and drug interactions of micafungin make this an attractive option. Limited experience has been reported in pediatric HCT patients with non-malignant disorders. We report our experience with daily micafungin antifungal prophylaxis in pediatric allo-HCT patients with non-malignant disorders.

Methods: A retrospective descriptive analysis of 28 pediatric patients with a variety of non-malignant disorders undergoing allo-HCT and prophylaxis with micafungin is provided. The median age at allo-HCT was 5 years (range, 0.4-11). No patient had a previous invasive fungal infections, hepatic, or renal dysfunction except for one patient with hepatic fibrosis. Cyclosporine was used for graft-versus-host disease prophylaxis.

Results: Table 1 provides a summary of results associated with daily micafungin antifungal prophylaxis. Micafungin was discontinued in one patient due to liver function test abnormalities. A baseline elevation in AST, ALT, and bilirubin was documented in 25%, 39%, and 0% of patients; respectively. There was a two-fold increase in AST, ALT, and bilirubin in 60%, 67%, and 85% of patients during treatment; these decreased on therapy. A similar trend was noted in renal function. Cyclosporine levels did not fluctuate significantly during therapy.

Conclusion: Daily micafungin prophylaxis is a well-tolerated method which may prevent fungal infections in pediatric allo-HCT patients with non-malignant disorders. Further study of micafungin prophylaxis to evaluate the efficacy of micafungin in the prevention of fungal infections in pediatric allo-HCT recipients with non-malignant disorders is needed.