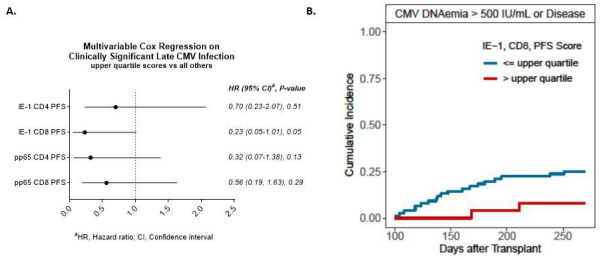

Figure 3 – A) Multivariable Cox regression of upper quartile CMV-specific polyfunctionality scores (PFS) on late clinically significant CMV infection (as defined by CMV disease or by a viral load greater than 500 IU/mL for the assay used). B) Cumulative incidence of clinically significant CMV infection between days 100-270 post-HCT in patients with upper quartile CD8+ IE-1 PFS compared to all other scores.

Conclusion: Our findings demonstrate that COMPASS is a valuable tool to evaluate multiple, T-cell cytokine responses to CMV in HCT recipients. COMPASS appears to be useful to identify patients at risk for late cs-CMV infection.

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195. Economic and Clinical Burden of Respiratory Virus Infections in Allogeneic Hematopoietic Cell Transplantation Recipients

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Session: O-38. Transplant and Immunocompromosed Hosts

Background: Respiratory viruses (RV), including respiratory syncytial virus (RSV), influenza, parainfluenza virus (PIV), and human metapneumovirus (HMPV), frequently lead to serious complications such as lower respiratory tract infections and death in allogeneic hematopoietic cell transplantation (HCT) recipients. We used a large US claims database to compare the total reimbursement (TR), health resource utilization (HRU) and clinical outcomes between HCT patients with and without RV infections (RVI).

Methods: We used the Decision Resources Group Real World Evidence Data Repository to identify HCT recipients with date of service for the procedure from 1/1/2012-12/31/2017. We estimated the reimbursements from submitted charges using a reimbursement to charge ratio of 0.425. We examined the study outcomes in the year following HCT in patients with and without RVI. We also used a generalized linear model to determine adjusted TR stratified by the presence or absence of any acute or chronic graft-versus-host diseases (GVHD) after adjusting for age, health plan, underlying disease, stem cell source, number of comorbidities, baseline costs, and follow-up time.

Results: The study included 13,363 patients, representing 22% of HCTs reported to CIBMTR for the study period, of which 1,368 (10%) were coded with an RVI in the year following HCT: 578 (4%) RSV, 687 (5%) influenza, 166 (1%) PIV, and 181 (1%) HMPV. Unadjusted median TR were $132,395 higher for any RVI ($139,439 RSV, $101,963 influenza, $185,041 PIV and $248,029 HMPV) compared to those without RVI (**Table 1**). Adjusted TR were significantly higher for patients with any RVI compared to patients without that infection (p< .01) with or without GVHD (**Figure 1**). Patients with any RVI had significantly longer length of stay (LOS) for the HCT hospitalization, readmission rate and LOS after HCT hospitalization compared to patients without RVI (p< 0.05) (**Table 2**). A significantly higher proportion of patients with any RVI had pneumonia as compared to patients without that infection, irrespective of presence of GVHD (p< .0001).

Table 1: Total healthcare reimbursement within one year of undergoing allogeneic HCT for patients with and without respiratory viral infections

Observed total reimbursement (2019 USD)	RVI within 1 year of HCT			P-value
	With infection	Without infection	Difference in medians	
Any RVI (RSV, Influenza, PIV or HMPV)	**n=1368**	**n=11995**		
Median [Q1 ; Q3]	353,251 [178,189 ; 637,219]	220,856 [95,303 ; 439,876]	132,395	<.0001
RSV	**n=578**	**n=12785**		
Median [Q1 ; Q3]	365,600 [194,047 ; 657,393]	226,161 [99,197 ; 450,597]	139,439	<.0001
Influenza	**n=687**	**n=12676**		
Median [Q1 ; Q3]	328,762 [153,768 ; 628,193]	226,799 [98,863 ; 449,737]	101,963	<.0001
PIV	**n=166**	**n=13197**		
Median [Q1 ; Q3]	414,671 [245,157 ; 709,668]	229,630 [100,582 ; 454,503]	185,041	<.0001
HMPV	**n=181**	**n=13182**		
Median [Q1 ; Q3]	477,463 [257,397 ; 773,445]	229,434 [100,462 ; 453,161]	248,029	<.0001

Total health care reimbursements were calculated by applying reimbursement to charge ratio of 0.425 to the total submitted charges

Figure 1: Adjusted total reimbursements within one year of undergoing allogeneic HCT for patients with and without respiratory viral infections

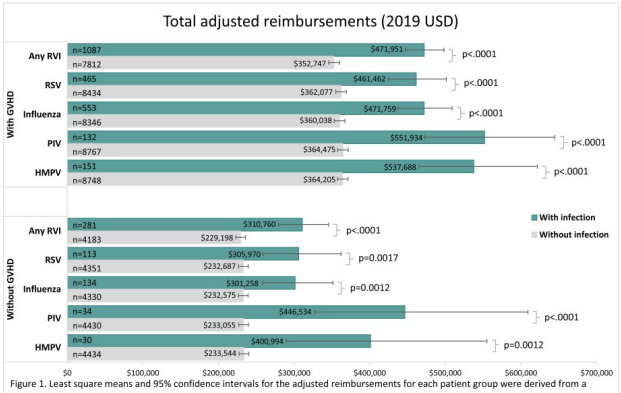

Figure 1. Least square means and 95% confidence intervals for the adjusted reimbursements for each patient group were derived from a generalized linear model. The model provided estimates adjusted for age, health insurance plan, underlying disease, stem cell source, number of comorbidities, costs at baseline, GVHD during follow-up, interaction between presence of RVIs and GVHD and follow-up time.

Table 2: Health resource utilization within one year of undergoing allogeneic HCT for patients with and without respiratory viral infections

	RVI within 1 year of HCT		P-value
	With infection	Without infection	
Any RVI (RSV, Influenza, PIV or HMPV)	**n=1368**	**n=11995**	
LOS for allo-HCT hospitalization, Median [Q1 ; Q3]	25.0 [18.0 ; 35.0]	23.0 [16.0 ; 31.0]	<.0001
Readmission rate (per person yr) (95% CI)	3.2 (3.1 - 3.3)	1.9 (1.8 - 1.9)	<.0001
LOS after allo-HCT hospitalization, Median [Q1 ; Q3]	26.0 [11.0 ; 60.0]	22.0 [9.0 ; 49.0]	<.0001
RSV	**n=578**	**n=12785**	
LOS for allo-HCT hospitalization, Median [Q1 ; Q3]	25.0 [18.0 ; 36.0]	23.0 [16.0 ; 31.0]	<.0001
Readmission rate (per person yr) (95% CI)	3.1 (3.0 - 3.3)	2.0 (1.9 - 2.0)	<.0001
LOS after allo-HCT hospitalization, Median [Q1 ; Q3]	25.0 [11.0 ; 56.5]	22.0 [9.0 ; 50.0]	0.0083
Influenza	**n=687**	**n=12676**	
LOS for allo-HCT hospitalization, Median [Q1 ; Q3]	24.0 [18.0 ; 34.0]	23.0 [16.0 ; 32.0]	0.0002
Readmission rate (per person yr) (95% CI)	3.2 (3.0 - 3.3)	1.9 (1.9 - 2.0)	<.0001
LOS after allo-HCT hospitalization, Median [Q1 ; Q3]	26.0 [10.0 ; 62.0]	22.0 [9.0 ; 50.0]	0.0021
PIV	**n=166**	**n=13197**	
LOS for allo-HCT hospitalization, Median [Q1 ; Q3]	26.0 [21.0 ; 36.0]	23.0 [16.0 ; 32.0]	0.0001
Readmission rate (per person yr) (95% CI)	4.2 (3.9 - 4.6)	2.0 (2.0 - 2.0)	<.0001
LOS after allo-HCT hospitalization, Median [Q1 ; Q3]	40.5 [17.0 ; 76.5]	22.0 [9.0 ; 50.0]	<.0001
HMPV	**n=181**	**n=13182**	
LOS for allo-HCT hospitalization, Median [Q1 ; Q3]	24.0 [19.0 ; 33.0]	23.0 [16.0 ; 32.0]	0.0423
Readmission rate (per person yr) (95% CI)	3.6 (3.3 - 3.9)	2.0 (2.0 - 2.0)	<.0001
LOS after allo-HCT hospitalization, Median [Q1 ; Q3]	29.0 [10.5 ; 67.0]	22.0 [9.0 ; 50.0]	0.0031

Conclusion: Allogeneic HCT patients with RVI have a significantly higher burden of TR, health resource utilization and worse clinical outcomes such as pneumonia during one year of undergoing HCT, regardless of the presence of GVHD.

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196. Antibodies to Vaccine-preventable Infections After CAR-T Cell Immunotherapy for B Cell Malignancies

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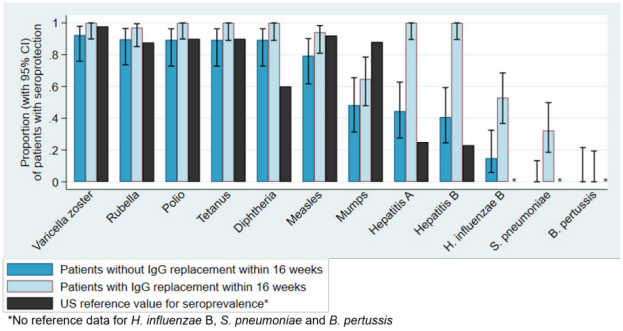
Session: O-38. Transplant and Immunocompromosed Hosts

Background: Chimeric antigen receptor-modified T (CAR-T) cell immunotherapy for B cell hematologic malignancies results in prolonged B cell depletion. Little is known about the effects of CAR-T cell therapy on pre-existing pathogen-specific humoral immunity.

Methods: We conducted a prospective, cross-sectional study of children and adults treated with CD19- or BCMA-CAR-T cell therapy. Eligible patients were ≥ 6 months post-CAR-T cell infusion and in remission without subsequent chemoimmunotherapy. We measured total immunoglobulin G (IgG), pathogen-specific IgG levels for 12 vaccine-preventable infections, and B cell subsets from blood. Seroprotective antibody titers were based on standard thresholds. We described the proportion of patients with seroprotective titers and tested for associations between clinical factors and seroprotection using generalized estimating equations.

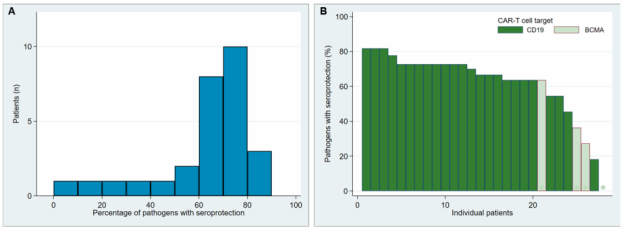
Results: We enrolled 65 patients who received CD19- (n=54) or BCMA- (n=11) CAR-T cell therapy. Seven patients were < 18 years old. Samples were collected a median of 20 months (range, 7–68) after CAR T cell infusion. Seroprotection to vaccine-preventable pathogens was generally comparable to the U.S. population (**Fig 1**) even though blood CD19+ B cell counts were low (< 20 cells/mm^3) in 60% of patients. Among 30 patients without IgG replacement in the prior 16 weeks (4 half-lives of IgG), 27 (90%) had hypogammaglobulinemia. Despite this, these individuals had seroprotection to a median of 67% (IQR, 59%-73%) of tested pathogens (**Fig 2A**). The proportion of patients with seroprotection was lowest for mumps, hepatitis A and B, *H. influenzae* type B (Hib), *S. pneumoniae,* and *B. pertussis*. Patients receiving BCMA-CAR-T cells had seroprotection to fewer pathogens than those receiving CD19-CAR-T cells (**Fig 2B**), but the difference did not reach statistical significance (**Fig 3**). There were no significant differences by other variables.

Figure 1. Proportion of CAR-T cell recipients with seroprotection to vaccine-preventable infections compared to the U.S. population, stratified by receipt of IgG replacement in the previous 16 weeks.



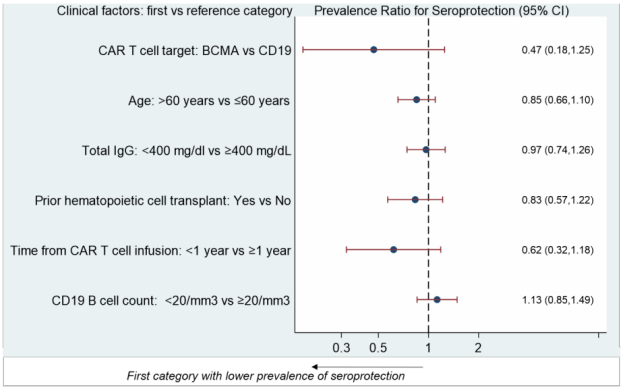
*No reference data for *H. influenzae* B, *S. pneumoniae* and *B. pertussis*

Figure 2 A-B. Percentage of pathogens with seroprotective antibody titers among patients without IgG replacement in the previous 16 weeks.



(A) Distribution of the percentage of pathogens for which patients have seroprotective antibody titers (B) Percentage of pathogens with seroprotective antibody titers per patient. (A-B) Results of 28 patients with >5 valid test results are shown. Pertussis results are excluded due to incomplete test series.

Figure 3. Association of clinical factors with seroprotection to vaccine-preventable infections among patients without IgG replacement in the previous 16 weeks (n=30)



A prevalence ratio <1 represents lower prevalence of seroprotection among pathogens in the first vs the reference category; BCMA-CAR-T cell recipients had fewer seroprotective antibody titers compared to CD19-CAR-T cell recipients but this difference did not reach statistical significance

Conclusion: Seroprotection for vaccine-preventable infections after CD19-CAR-T cell therapy was comparable to the general population. BCMA-CAR-T cell recipients may benefit most from replacement IgG. Vaccinations after CAR-T cell therapy should be considered and prioritized for *S. pneumoniae*, Hib, hepatitis viruses, and *B. pertussis*.

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197. Dengue Virus Infection Among Renal Transplant Recipients in Singapore: A 15-year Single Center Retrospective Review

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Session: O-38. Transplant and Immunocompromosed Hosts

Background: Dengue is a mosquito-borne viral infection endemic in Singapore. Its clinical course in the immunocompetent host is well characterised but its impact in renal transplantation is not well described. We aim to characterise the clinical presentation and outcomes of dengue virus infection in renal transplant recipients treated at a tertiary center in Singapore.

Methods: We conducted a 15 year retrospective review of dengue in renal transplant patients treated at Singapore General Hospital between January 2005 to October 2019. The diagnosis of dengue was made if there were a compatible clinical syndrome and a positive dengue diagnostic assay, either Dengue NS1 antigen, IgM or PCR.

Results: Thirty-two renal transplant patients were diagnosed with dengue, 18 (56.3%) were deceased donor recipients. The median age at time of diagnosis was 53 [IQR 42,61] years; 16 (50%) were males. The median time to diagnosis of dengue was 95.5 [IQR 15.0,95.5] months from transplant; and the median duration of clinical illness was 7 [IQR 5,7] days. The most common clinical symptoms were fever (84.4%), myalgia (40.6%), gastrointestinal symptoms (37.5%) and headache (25.0%). Based on the WHO 2009 dengue classification, 20 (62.5%) had dengue without warning signs, 9 (28.1%) had dengue with warning signs, and 3 (9.4%) had severe dengue; 19 (59.3%) had graft dysfunction and 1 (3.1%) required dialysis. Of the patients who had graft dysfunction, 18 (94.7%) had recovery of graft function at time of dengue resolution. Dengue mortality rate was 3.1%. There were 2 possible cases of donor derived dengue infections, occurring within 2 weeks of deceased donor transplantation.

Conclusion: Dengue in renal transplant is usually community acquired; donor derived infections are uncommon. The clinical presentation of dengue is similar to the immunocompetent host, however graft dysfunction is common and fluid management in this population is important. Severe dengue is less common.

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