Incremental Inpatient Healthcare Resource Use and Costs Among CMV Seropositive Allogeneic Stem Cell Transplant Recipients Managed Through Preemptive Approach

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Background: Quantifying the impact of pre-emptive therapy (PET) on the cost of allogeneic hematopoietic stem-cell transplant (HCT) is essential for assessing the net economic value of preventive strategies. We quantified the inpatient healthcare resource use and costs through Day 180 for a large contemporary cohort of CMV R+ HCT recipients managed preemptively in a single institution to examine the impact of PET on healthcare resource use and costs.

Methods: This retrospective cohort study included adult, CMV R+ recipients of first peripheral blood or marrow allografts from 03/2013 to 12/2017 routinely monitored post HCT for CMV by a quantitative PCR assay and managed preemptively. PET was initiated per standard of care. Clinical characteristics and hospitalization data through Day 180 were extracted from the electronic medical records. Inpatient charges were obtained from the Vizient billing database and converted to adjusted costs for 2017 USD using cost-to-charge ratios, wage index and inflation rate. Charges were divided into four categories: clinical procedure (including surgery, laboratory, transfusion, hemodialysis etc.), room & board, pharmacy and imaging services. Generalized linear model with log links and gamma distribution was used to estimate incremental total inpatient costs by PET use accounting for demographic and transplant characteristics.

Results: Of 368 R+ patients, 208/368 (57%) received PET for a median duration of 47 days (IQR: 34-70). 112/208 (54%) PET recipients were readmitted compared to 53/160 (33%) of No-PET recipients ($p<0.01$). Of 180 readmissions among PET recipients 67 (37%) were CMV-related with an average total cost per patient $185,053 (SD: 237,099). The total readmission(s) cost for patients with CMV-related readmission(s) were higher than the cost of those without CMV-related readmission(s) (average $253,083 vs. $144,684, $p<0.01$). The mean incremental total readmission cost for the PET group was $42,882 compared with the NO-PET group (P=0.04) (Figure 1a). 23/368 (6.25%) developed CMV end organ disease (EOD) by Day 180. CMV EOD was associated with

an incremental cost of $131,137 compared to those without EOD (P<0.01). In multivariable analyses, PET, grade 2-4 acute GVHD and CMV EOD had 22%, 63% and 42% for greater inpatient costs after adjusting for other characteristics, respectively (Figure 1a). Breakdown of costs showed that PET recipients incurred higher average inpatient costs in clinical procedures, room & board and pharmacy categories compared with NO-PET group (Figure 1b).

Conclusion: PET recipients had significant higher total readmission costs compared with NO-PET group even after adjusting for baseline demographic and clinical characteristics. Our study findings showed that managing CMV through preemptive approach had substantial incremental inpatient healthcare resource and costs in CMV R+ HCT recipients and highlight needs for future interventions to reduce the excess healthcare resource use and costs.

Figure 1a. Multivariate predictors of increased inpatient costs by Day 180 post HCT

	Total inpatient costs by Day 180			
Risk factor	**Adjusted Cost Ratio[a]**	**(95% CI)**	**P-value[b]**	**Mean Cost Difference**
PET Use				
Yes vs. No (ref)	1.2296	(1.01, 1.50)	**0.0409**	$42,882
CMV End Organ Disease				
Yes vs. No (ref)	1.634	(1.22, 2.18)	**0.0008**	$131,137
Acute graft *vs.* host disease				
Grade 2-4 vs. 0-1 (ref)	1.4237	(1.17, 1.74)	**0.0005**	$86,131

a. Independent variables included baseline demographic and clinical characteristics
b. P-values based on generalized linear models with gamma distribution and log links

Figure 1b. Comparison of average inpatient costs categories per patient by PET group