Economic Burden of Bronchiolitis Obliterans Syndrome (BOS) Following Allogeneic Hematopoietic Stem Cell Transplant (alloHSCT) in Patients with Commercial Insurance in the United States

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Introduction

**Background**
- Bronchiolitis obliterans syndrome (BOS), also known as pulmonary chronic graft versus host disease (cGVHD), is an obstructive alveolar disease of the lungs associated with alloHSCT or lung transplantation.
- BOS is characterized by T-cell mediated inflammation and fibrosis of bronchiolar walls, leading to the diameter of the bronchioles and result in progressive and irreversible airflow obstruction.
- BOS is a well described complication, affecting 48% of lung transplant recipients within 5 years of transplantation. It can also be a complication following alloHSCT, affecting an estimated 9% of patients with comparable histopathology and clinical symptoms.
- There is currently no approved therapy for the treatment of BOS.
- Little is known about the impact of BOS on healthcare resource use (HRU) and costs in alloHSCT patients.

**Study Goal**
- To quantify the economic burden of BOS in alloHSCT patients.

**Methods**

- **Data source:** IQVIA PharMetrics PlusTM commercial claims database, with enrollment, demographic, and claims data for over 140 million individuals in the U.S. from 1/1/2007 to 9/30/2017.
- **Study Patients:** 322 patients between 0-66y of age treated with alloHSCT from 1/1/2007 to 9/30/2017 (Figure 1). Patients who developed BOS after alloHSCT were propensity score matched to patients who did not develop BOS (Figure 2).
- **Study Design:** Longitudinal, retrospective analysis.

**Results**

- **Study Patients:** 161 alloHSCT patients who developed BOS were matched with 161 patients who did not develop BOS.
- Mean age was 51.0y (SD: ±12.13), and age range was 6 to 84y; the majority of patients were male (60%).
- There were no significant differences between matched groups in demographic or clinical characteristics, with the exception of patients with BOS patients with leukemias (80%) vs. no BOS: 69% and chronic pulmonary disease (BOS: 24% vs. no BOS: 16%).
- BOS and no BOS patients counts dropped to 77 and 74 in year 2 post alloHSCT respectively. This hospital mortality rate in the Medicare claims data is 67% higher than no BOS patients ($72,820 vs. $43,665) (Figure 4).
- Among patients who developed BOS, mean per patient costs were 37% higher in the first year after alloHSCT, compared with controls ($560,048 vs. $408,764) (Table 2).
- Patients with BOS had 1.5x higher rates of inpatient admissions, on average, in year 1 post alloHSCT No BOS (Figure 3).
- Inpatient costs were responsible for most of this difference ($446,622 vs. $300,146), reflecting higher inpatient admission rates (Figure 4).
- Although costs for patients observable in the second post-alloHSCT year were lower for both patient groups, the cost of treating BOS patients was 67% higher than no BOS patients ($72,820 vs. $43,665) (Figure 4).
- Long function test costs were lower than 3% more than for BOS patients and base line treatment costs 2.5 times as high in first year after transplant.

**Conclusions**

- AlloHSCT patients who develop BOS in the U.S. have higher rates of hospitalization and require more lung function tests and more treatments, compared with alloHSCT patients with no evidence of BOS.
- These higher rates of healthcare service use are accompanied by additional mean annual per patient costs accumulating to $151,000 in the first post-alloHSCT year.
- Increased awareness of patients at risk of developing BOS will have meaningful implications for healthcare resource utilization.

**References**


**Conflict of Interest Disclosures**
- Dr. Henig is an employee of Breath Therapeutics, a Zambon company.
- Dr. Sacks, Dr. Cyr and Dr. Healey are employees of Precision Health, a division of the Precision Medicine Group, which received funding from Breath Therapeutics for this research.
- Dr. Batt is a consultant to the Precision Medicine Group.