Lung function monitoring in allogeneic hematopoietic stem cell transplant (allo-HSCT) patients

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INTRODUCTION

Background

- Bronchiolitis obliterans syndrome (BOS) is an obstructive airway disease of the lungs that affects 5.5 to 14.8% of allogeneic hematopoietic stem cell transplant (allo-HSCT) patients
- One of its defining clinical manifestations is a decline in forced expiratory volume in 1 second (FEV1) in the presence of airflow obstruction, as quantified by spirometry along with other lung function tests
- Prompt diagnosis through lung function testing may correlate to improved outcomes, but lung function testing rates following allo-HSCT have not been examined

Study Goal

- To analyze lung function testing rates before and after allo-HSCT in the US

METHODS

Data Source

- IQVIA PharMetrics Plus commercial database (1/1/06-9/30/18)
- Medicare Limited Dataset (1/1/20-12/31/18)

Study Patients

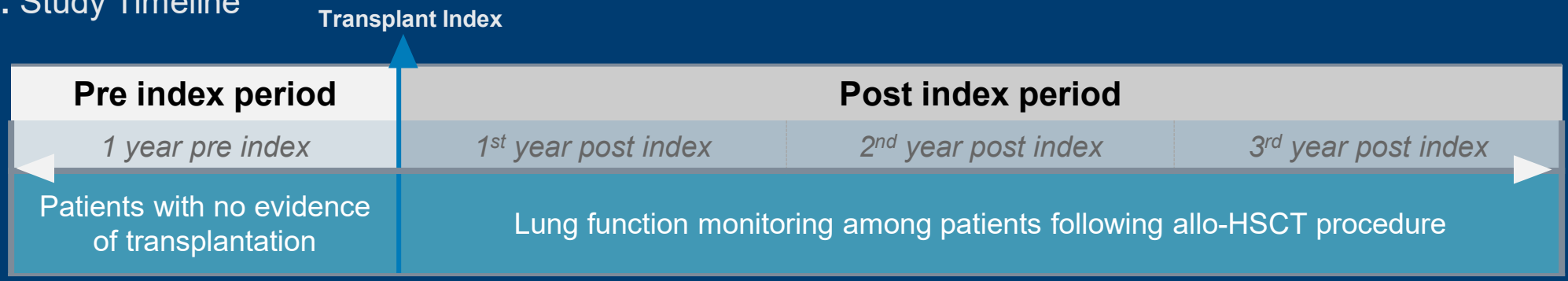
- 2,187 commercially insured and 1,864 Medicare patients who underwent allo-HSCT, identified using International Classification of Disease (ICD) 9th and 10th revision procedure codes in the inpatient and outpatient hospital setting and DRG (014)
  - Commercially insured patients age 0-64y
  - Medicare patients were age 65 and older
- Study patients were required to have no evidence of transplantation for at least 12 months prior to index transplant and were followed for up to three years after index transplant (**Figure 1**)

METHODS CONT.

Study Design

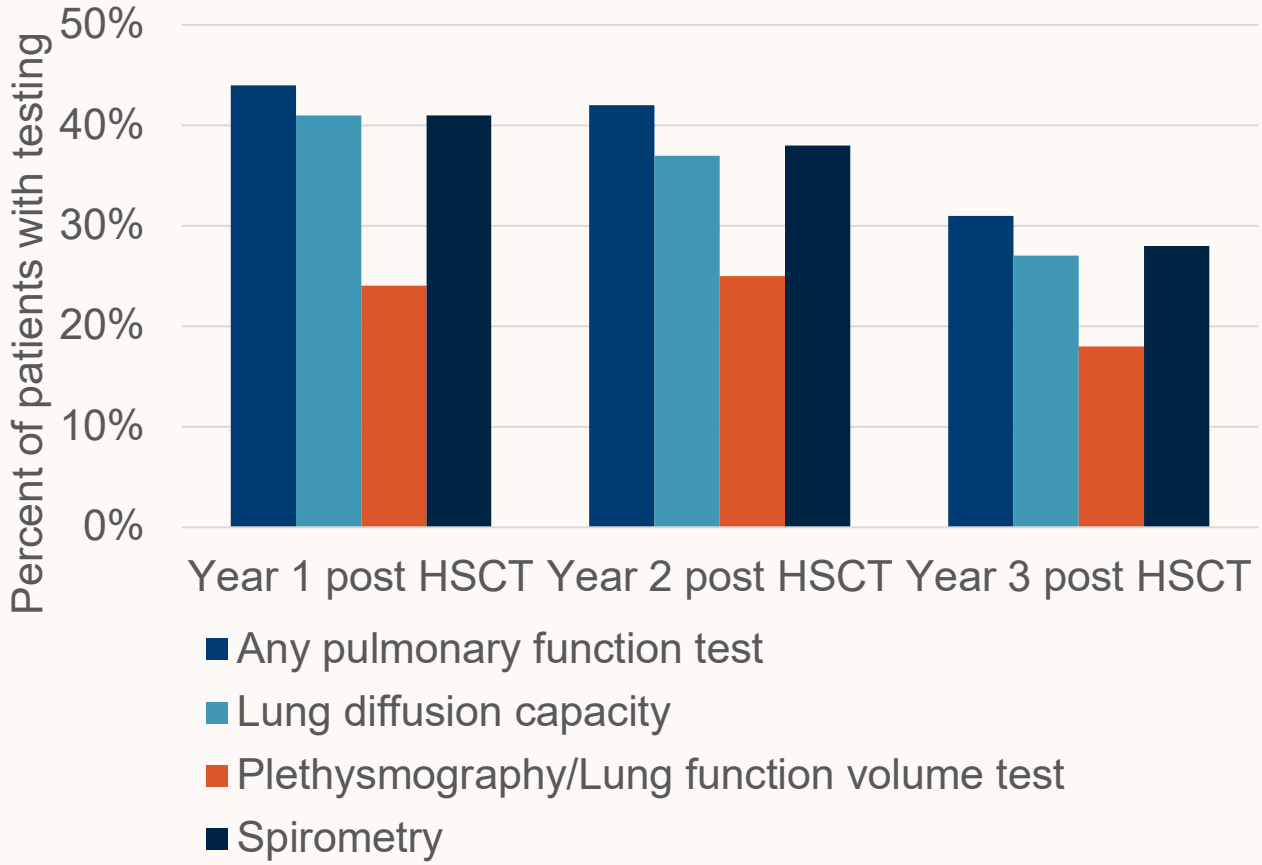
- Retrospective cohort study with 3 years of follow up
- Lung function tests identified using Common Procedure Terminology (CPT) and International Classification of Disease 9th and 10th revision procedure codes
- Outcome measures were the proportions of patients receiving any testing each year, and the mean annual annual number of tests per patient
- All measures were calculated for patients receiving at least one lung function test of any kind, and for specific tests: spirometry, lung diffusion capacity, and plethysmography/lung function volume.

Figure 1. Study Timeline



RESULTS: Commercially insured patients

Figure 2. Commercial Patients with Pulmonary Function Testing

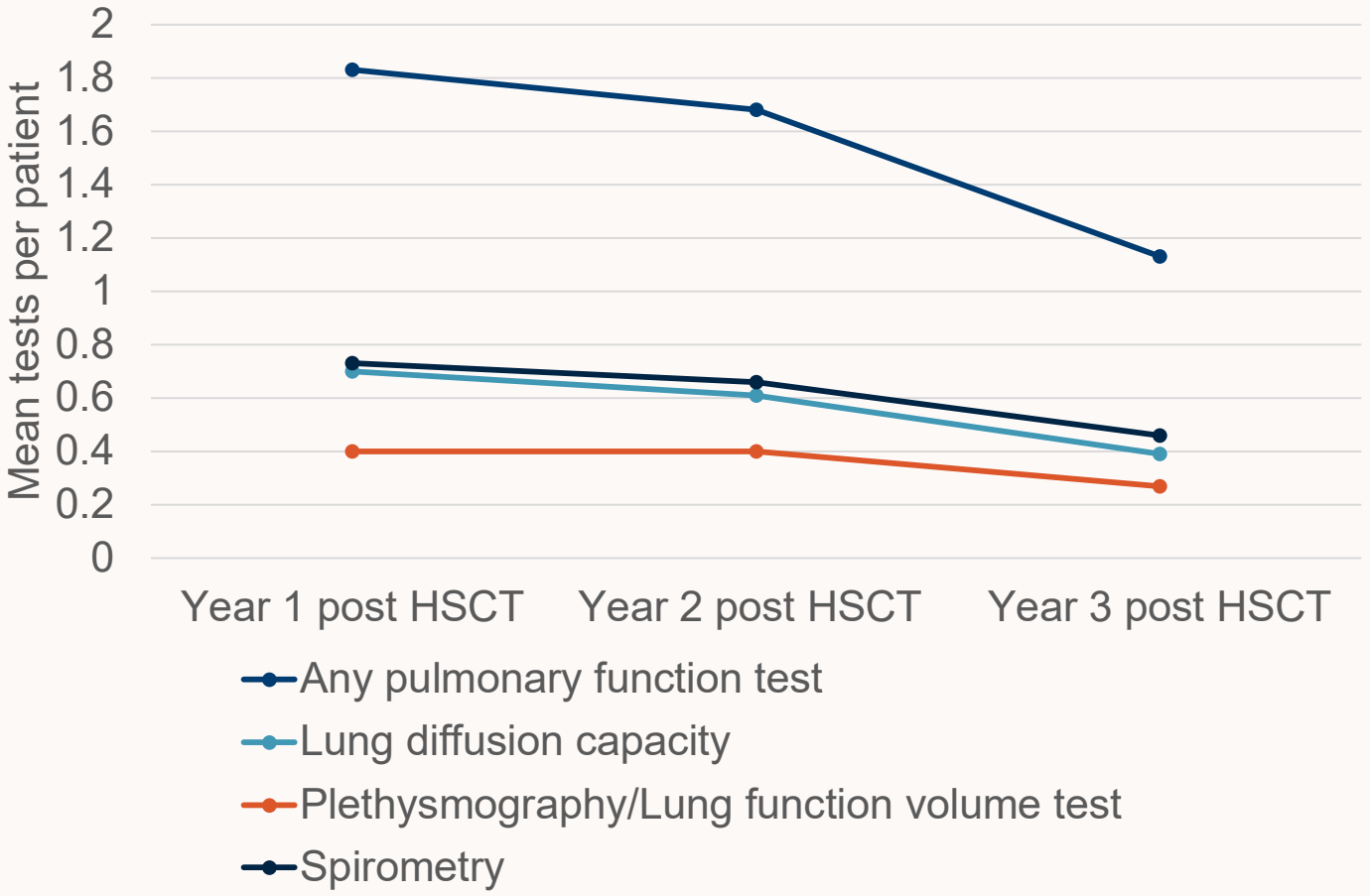


- 41% of all patients received at least one lung function test in the first year following transplantation
- Among those who survived more than one year, the percentage with any lung function test declined over time
- 42% of commercially insured patients received any tests in year 2 and 31% in year 3.
- The proportions of patients receiving specific tests further declined over the study period, including spirometry, with 41% of all patients receiving spirometry in year 1 and 38% in year 2, but only 28% receiving spirometry tests in year 3

RESULTS: Commercially insured patients

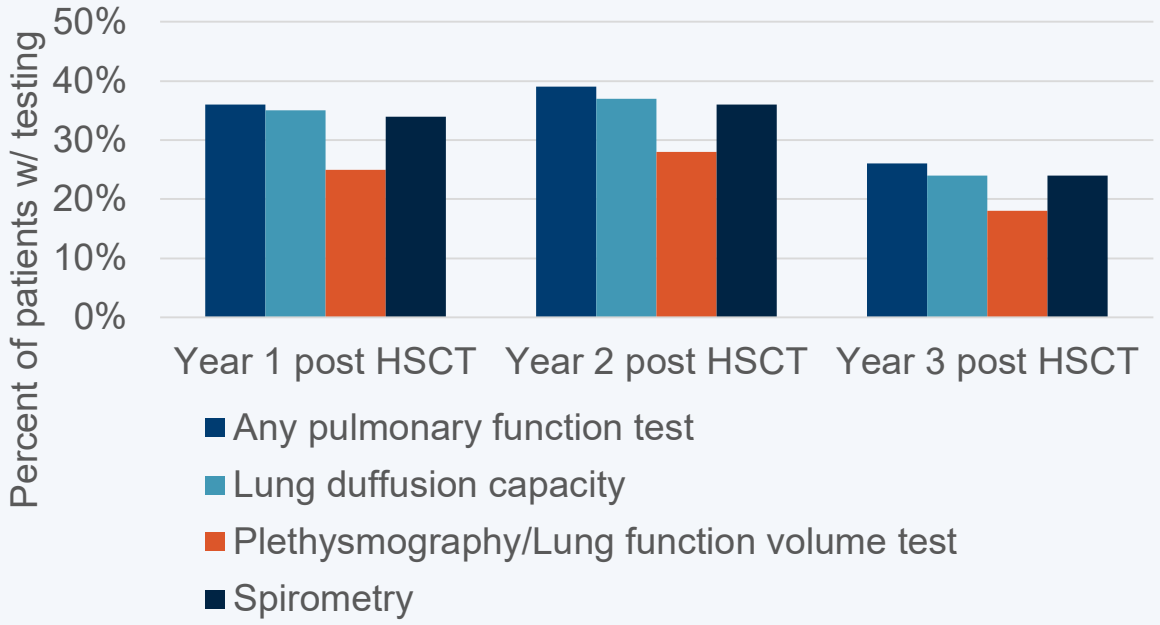
- The mean annual number of tests administered per patient also declined
  - Rates of spirometry, which were 0.73±1.1 for commercial in year 1 and in year 2 declined to 0.46±1.1 in year 3 Rates of lung diffusion capacity and plethysmography/lung function volume testing also declined, with significantly fewer tests per patient in year 3, compared with years 1 and 2

Figure 3. Average Pulmonary Function Tests Per Commercial Patient



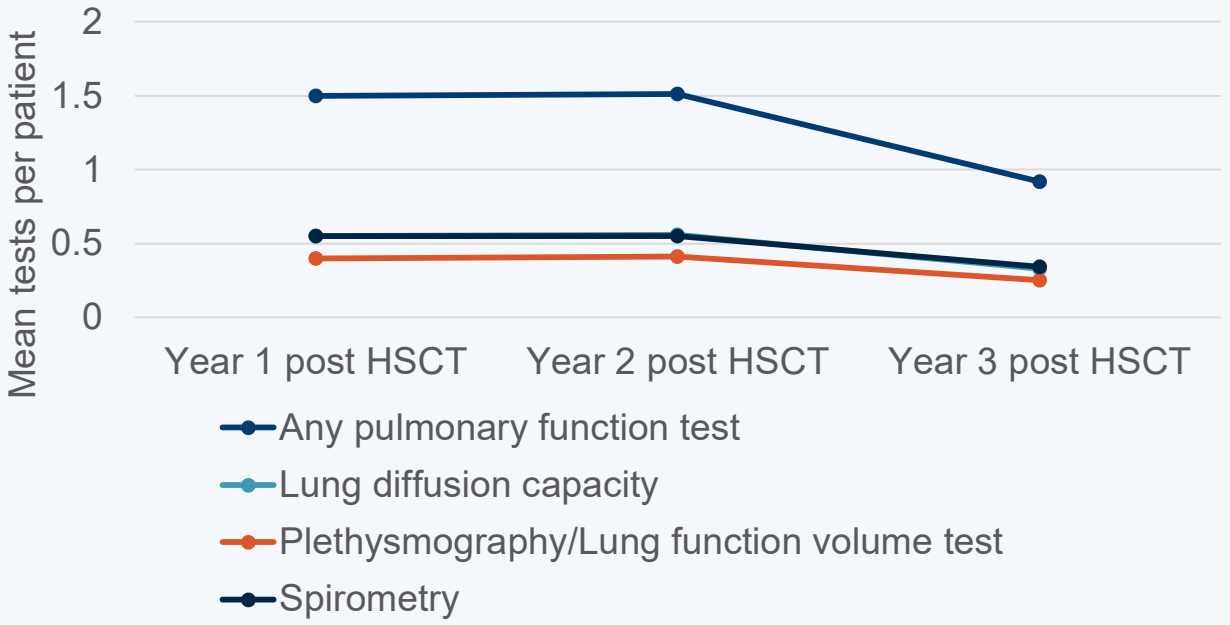
RESULTS: Medicare Patients

Figure 4. Medicare Patients with Pulmonary Function Testing



- The percentage of Medicare patients with any lung function test declined over time with 39% receiving any test in year 2 and 26% in year 3

Figure 5. Average Pulmonary Function Test Per Medicare Patient



- The mean annual number of tests administered per patient also declined
- Rates of spirometry, which were 0.55±0.9 in year 1 and 0.55±0.9 in year 2 declined to and 0.34±0.7 in year 3

CONCLUSIONS

- Morbidity and mortality from BOS remain high in allo-HSCT patients, but only a minority of study patients received lung function testing in the first year following allo-HSCT, with even fewer in year 3
- Testing rates were significantly lower in year 3, indicating that patients received fewer tests over time
  - This decrease was evident in commercially insured patients in the second year after transplant, and was greatest for all patients in the third year, when patients remain at risk of BOS
  - These declines in testing may lead to a delayed or missed diagnosis of BOS.
- Fewer Medicare patients received any pulmonary function testing, which may indicate a greater need for increased testing in older and disabled patients
- Increased and sustained monitoring of allo-HSCT patients, potentially with more home monitoring, could lead to earlier detection of BOS and earlier intervention and treatment

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Disclosures

- Dr. Boerner is an employee of Breath Therapeutics, a Zambon company
- Mr. Cuomo is an employee of Zambon Group
- Dr. Sacks, Dr. Raza, Mr. Cyr, Ms. Liu and Ms. Healey are employees of PRECISIONheor, 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
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