# Validating Airflow Obstruction in Patients Diagnosed With Chronic Obstructive Pulmonary Disease: A Health Care System's Experience

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## Introduction

- A confirmed diagnosis of COPD requires spirometric demonstration of persistent airflow obstruction, defined as a post-bronchodilator $FEV_1/FVC$ ratio below 0.70.
- COPD is frequently diagnosed without spirometric confirmation. A meta-analysis estimated that approximately 42% of patients considered to have COPD did not meet spirometric criteria for airflow obstruction.
- COPD misdiagnosis may result in unnecessary inhaled therapies and delayed recognition of alternative conditions, including asthma, heart failure, and other pulmonary diseases.
- Overdiagnosis and overtreatment may also contribute to unnecessary healthcare expenditures and inefficient resource allocation.
- The extent of spirometric confirmation and its relationship with mortality within the Saint Francis Hospital healthcare system remains unknown.

## Study Objectives

**Primary Objective:**

- Determine the proportion of patients with a clinical diagnosis of COPD who demonstrate spirometrically confirmed airflow obstruction and characterize the timing of spirometry relative to the index COPD diagnosis

**Secondary Objectives:**

- Characterize GOLD spirometric severity among patients with spirometrically confirmed COPD
- Assess whether spirometric confirmation and severity of airflow obstruction are associated with mortality.

## Materials and Methods

**Study Design and Population**

- Retrospective cohort study using electronic medical records from Saint Francis Hospital, Hartford, CT.
- Primary provider in record must be a Trinity Health Of New England St Francis Hospital primary care professional
- Patients aged 40-89 years with a primary or secondary ICD-10 diagnosis of COPD and documented spirometry billing codes were identified from electronic medical records
- Approximately 650 patient charts were randomly selected from a larger eligible cohort for detailed review.
- Chart review index period: January 1, 2019–December 31, 2021.

**Patient Classification**

- **Group 1:** COPD diagnosis with no retrievable spirometry results available in the EMR.
- **Group 2:** COPD diagnosis with retrievable spirometry results but without airflow obstruction ($FEV_1/FVC \geq 0.70$).
- **Group 3:** COPD diagnosis with spirometrically confirmed airflow obstruction ($FEV_1/FVC < 0.70$).
- Confirmed cases will be further categorized according to GOLD spirometric severity.

## Materials and Methods (Continued)

**Data Collection**

- Spirometry: $FEV_1$, $FEV_1$ % predicted, FVC, FVC % predicted, and $FEV_1/FVC$; post-bronchodilator values preferred.
- Demographics: Age, sex, race, ethnicity, and insurance status.
- Clinical: Smoking history, respiratory distress at COPD diagnosis, and prior-year hospitalization.
- Cardiovascular comorbidities: ASHD, CHF, AF, PVD, and stroke.
- Other comorbidities: Lung cancer, other malignancies, diabetes, asthma, anxiety, depression, osteoporosis, low BMI, and obesity.
- Mortality: Date of death from EMR and Connecticut vital statistics.

## Preliminary Results

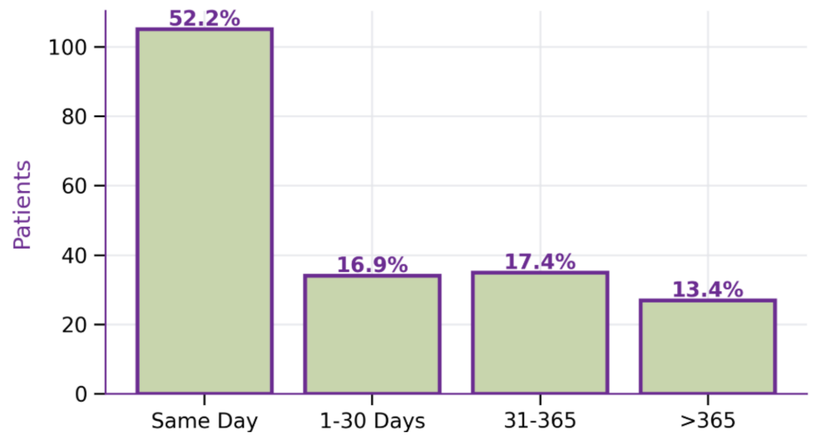
| Demographics | Overall Cohort (202) |
|---|---|
| Male sex, n (%) | 126 (61.5%) |
| Female sex, n (%) | 79 (38.5%) |
| White | 163 (79.5%) |
| Black | 18 (8.8%) |
| Asian | 3 (1.5%) |
| Hispanic | 8 (3.9%) |
| Other/Unknown | 13 (6.3%) |
| Hispanic ethnicity, n (%) | 21 (10.2%) |
| Medicare | 119 (58.0%) |
| Medicare Managed Care / Managed Care | 40 (19.5%) |
| Medicaid | 27 (13.2%) |
| Commercial | 15 (7.3%) |
| Self Pay / Uninsured | 4 (2.0%) |
| **Clinical Characteristics and Comorbidities** | |
| History of smoking | 169 (82.4%) |
| Hospitalization in prior year | 44 (21.5%) |
| ASHD | 71 (34.6%) |
| CHF | 31 (15.1%) |
| AF | 22 (10.7%) |
| Lung cancer | 22 (10.7%) |
| Other cancer | 19 (9.3%) |
| Diabetes | 38 (18.5%) |
| PVD | 13 (6.3%) |
| Stroke | 13 (6.3%) |
| Anxiety | 25 (12.2%) |
| Depression | 19 (9.3%) |
| Osteoporosis | 29 (14.1%) |
| Low BMI | 24 (11.7%) |
| Asthma | 46 (22.4%) |
| Respiratory failure | 29 (14.1%) |
| Obesity | 39 (19.0%) |

## Preliminary PFT Results

| Spirometry Variables | Result |
|---|---|
| Patients with retrievable spirometry results, n (%) | 202 (98.5%)* |
| Patients with FEV1/FVC < 0.70, n (%) | 117 (57.1%) |
| Patients with FEV1/FVC ≥ 0.70, n (%) | 85 (41.5%) |
| Mean FEV1/FVC ratio | 0.66 |
| Mean FEV1 % predicted | 70.4 |

*Because spirometry billing was an inclusion criterion, all study patients were presumed to have undergone spirometry. Availability rates reflect successful retrieval of test results from the medical record

**Timing of Spirometry Relative to Index Diagnosis**




**Key Findings**

- Spirometry data were available for 202 of 205 patients (98.5%), allowing objective assessment of airflow obstruction.
- Airflow obstruction ($FEV_1/FVC < 0.70$) was identified in 117 patients (57.1%).
- The mean $FEV_1/FVC$ ratio was 0.66, and the mean $FEV_1$ percent predicted was 70.4%.
- Most patients underwent spirometry on the same day as the index COPD diagnosis (52.2%) or within 30 days (69.1% cumulative).
- Approximately 13.4% of patients underwent spirometry more than one year after the index COPD diagnosis, demonstrating variability in the timing of objective pulmonary function testing.

## Next Steps

- Complete chart review and data validation.
- Determine rates of spirometrically confirmed airflow obstruction and characterize GOLD severity among patients with a clinical COPD diagnosis.
- Evaluate differences in baseline demographic and clinical characteristics across spirometry-defined groups.

**Statistical Analysis**

- Descriptive statistics will characterize the cohort, spirometric confirmation of airflow obstruction, and GOLD severity.
- Kaplan-Meier survival analyses and multivariable Cox regression will evaluate associations between spirometric confirmation, airflow obstruction severity, and mortality.