

# Association between Clinical Characteristics and In-Hospital Mortality in Patients with Idiopathic Pulmonary Fibrosis

Joshua Mooney, MD<sup>1</sup>; Karina Raimundo, MS<sup>2</sup>; Eunice Chang, PhD<sup>3</sup>; Michael S. Broder, MD, MSHS<sup>3</sup>

<sup>1</sup>Stanford University, Stanford, CA, USA; <sup>2</sup>Genentech, Inc., South San Francisco, CA, USA ; <sup>3</sup>Partnership for Health Analytic Research, LLC, Beverly Hills, CA, USA

## BACKGROUND

- Idiopathic pulmonary fibrosis (IPF) is a chronic, progressive, interstitial pneumonia of unknown cause that occurs predominantly in older adults.<sup>1</sup>
  - Median survival approximately 3-5 years after diagnosis.<sup>2</sup>
- Patients are frequently hospitalized for respiratory deterioration.
  - Hospitalizations are associated with increased mortality.
  - Predictors of in-hospital mortality have not been well studied.

## OBJECTIVE

- To identify predictors of in-hospital mortality in patients with IPF in the United States.

## METHODS

### Design and data source

- Cross-sectional retrospective cohort study using the National Inpatient Sample (NIS), the largest publicly available all-payer inpatient health care database in the US.
- Comprises information from discharge abstracts from > 7 million hospitalizations per year.
- Sample of hospitals drawn from all states participating in Healthcare Cost and Utilization Project (HCUP), covering more than 95% of the U.S. population.<sup>3</sup>

### Inclusion criteria:

- Hospitalization claim for IPF (ICD-9-CM code 516.3, 516.31) in years 2009-2011; and
- Hospital admission with principal diagnosis of respiratory disease (ICD-9-CM 460-519)

### Exclusion criteria:

- Admission for lung transplant

### Statistical Analysis

- All results weighted to represent national estimates.
- Logistic regression model used to estimate the association of demographic and clinical factors with in-hospital death.
- Domain analysis used to account for use of subpopulations rather than the entire sample.
- Statistical analyses performed using SAS® version 9.4.

## RESULTS

### Demographic and Clinical Characteristics

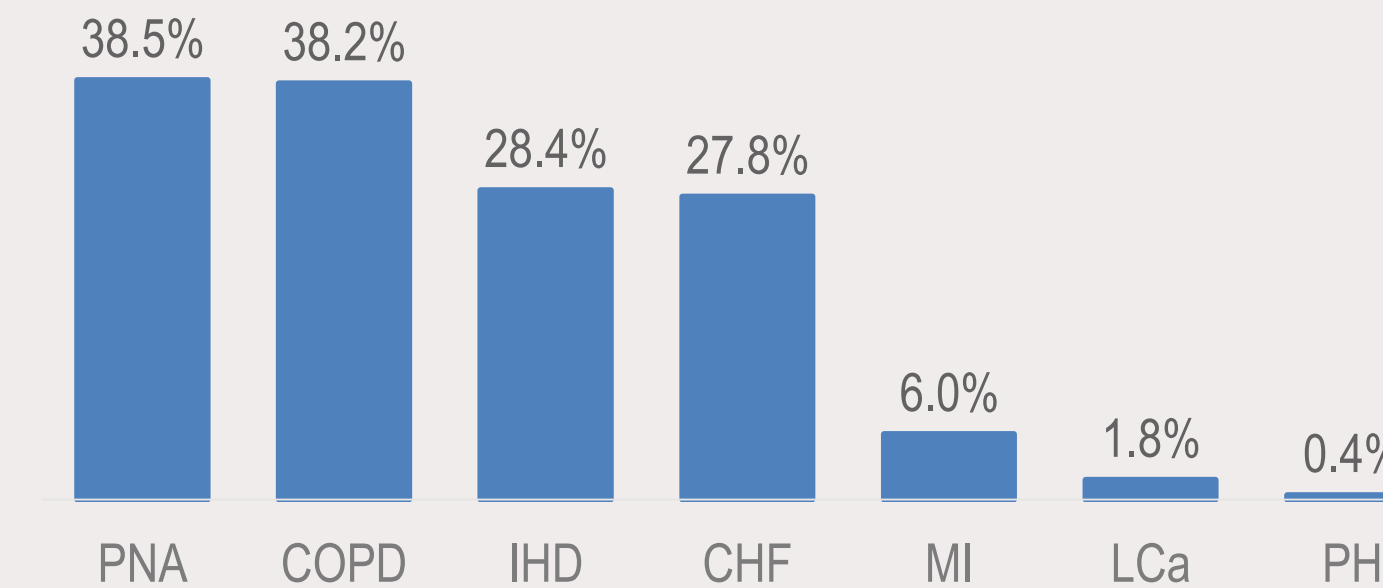
- From 2009-2011, 22,350 patients with IPF were admitted to US hospitals with a principal diagnosis of respiratory disease and did not undergo lung transplant.
  - 43.1% of hospital admissions had a principal diagnosis of IPF.
- Most common comorbidities were bacterial pneumonia, COPD, ischemic heart disease and congestive heart failure (**Figure 1**).

**Table 1: Patient Demographics, Hospital Characteristics and Admission Type**

	N = 22,350
Age, mean (SE)	70.0 (0.32)
Female, no. (%)	10,976 (49.1)
Race, no. (%)	
White	14,404 (64.4)
Black	1,707 (7.6)
Hispanic	2,110 (9.4)
Other	1,128 (5.0)
Missing	3,002 (13.4)
Primary payer type, no. (%)	
Medicare	15,297 (68.4)
Medicaid	1,531 (6.9)
Private (including HMO)	4,590 (20.5)
Other	932 (4.2)
Teaching hospital, no. (%)	9,687 (43.3)
Bed size, no. (%)	
Small	2,811 (12.6)
Medium	4,807 (21.5)
Large	14,447 (64.6)
Missing	286 (1.3)
Evidence of ED services <sup>a</sup> , no. (%)	14,912 (66.7)

<sup>a</sup>Defined by NIS as admission other than emergency, urgent, newborn, delivery, trauma center, or other-non elective; HMO: health maintenance organization; ED: emergency department.

**Figure 1: Comorbidities**

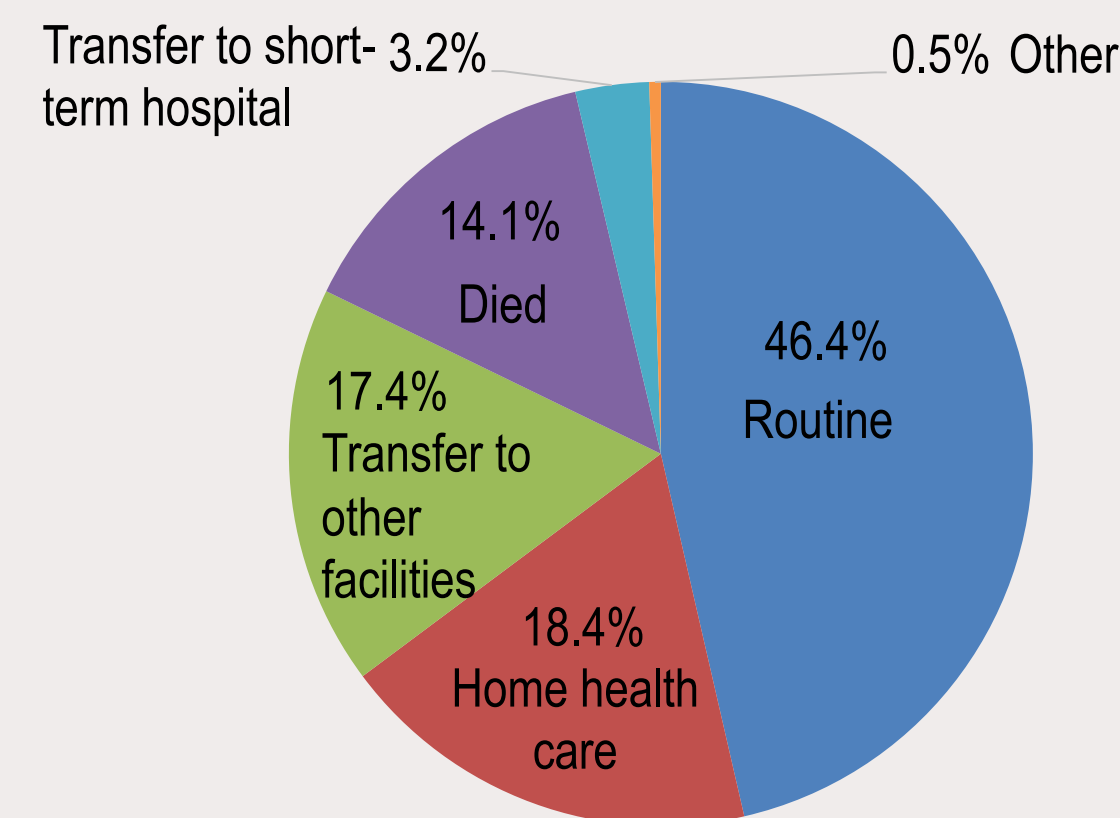


PNA=bacterial pneumonia; COPD=chronic obstructive pulmonary disease; IHD=ischemic heart disease; CHF=congestive heart failure; MI=myocardial infarction; LCa=lung cancer; PH=pulmonary hypertension.

### Mortality and Length of Stay

- Mean (SE) LOS was 7.4 (0.15) days among all IPF patients.
- 46.4% of patients discharged to routine care (**Figure 2**).
- 39% of patients were either transferred to a different facility or were discharged to home health care.
- 14.1% of patients died during hospitalization.

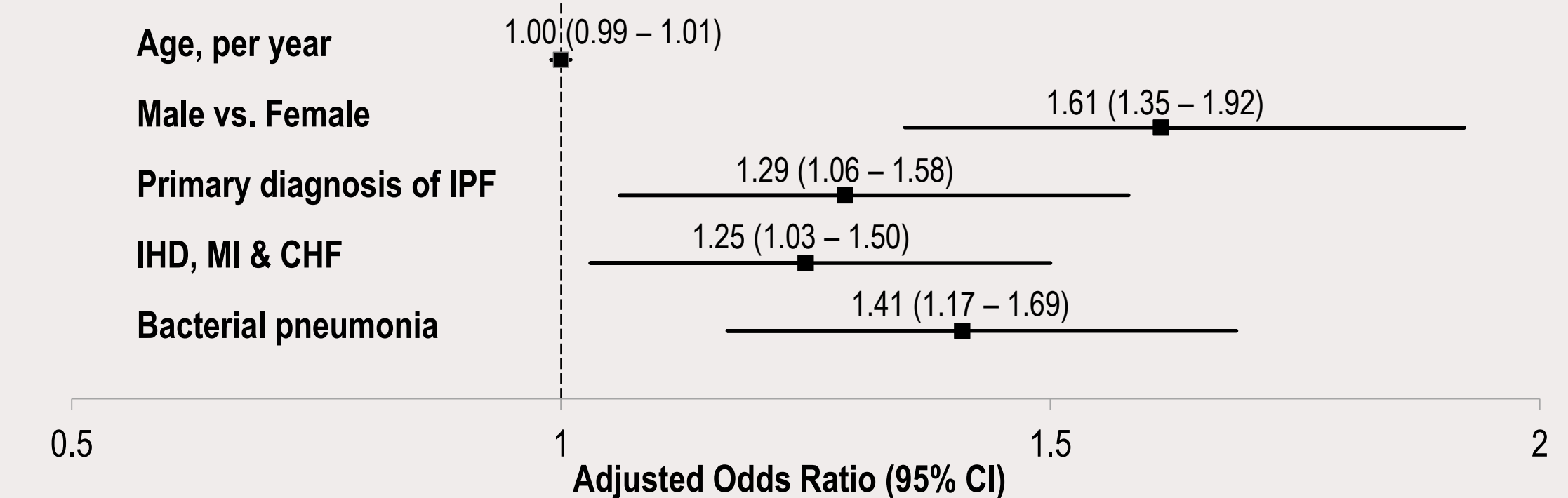
**Figure 2: Discharge Status**



### Multivariate Logistic Regression Model

- Males were more likely to die in-hospital (OR 1.61 p < .001).
- Hospital admissions with a principal diagnosis of IPF (OR 1.29 p=0.012), cardiovascular conditions (OR 1.25 p=.021), and bacterial pneumonia (OR 1.41 p<.001) increased likelihood of in-hospital death.

**Figure 3: Effects of Patient Characteristics on In-Hospital Death**



## LIMITATIONS

- A significant proportion of patients were transferred to other facilities and may have died before discharge from those facilities, possibly leading to underreporting of deaths.
- All analyses at the admission level; patients may contribute more than one observation.
- Common chronic IPF comorbidities that do not lead to hospitalization (e.g., GERD, sleep apnea and obesity) are likely underreported in a database of inpatient services.

## CONCLUSIONS

- 2 in 3 admissions of IPF patients with a principal diagnosis of respiratory disease come through the ED, suggesting unplanned admissions.
- In-hospital mortality is significant in IPF patients with at least 1 in 7 patients dying during hospitalization and fewer than half discharged with routine home care.
- Risk of in-hospital mortality is further increased in men and patients admitted with a principal diagnosis of IPF, ischemic heart disease (IHD), myocardial infarction (MI), congestive heart failure (CHF) or bacterial pneumonia.

### References:

- Ley B. J Clin Epidemiol. 2013;5:483-92.
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