

End of Life Costs for Medicare Patients with Idiopathic Pulmonary Fibrosis

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Idiopathic Pulmonary Fibrosis (IPF)

- Chronic, progressive, fibrotic lung disease associated with high mortality
 - Incidence of 93.7/100,000 PY (95% CI: 91.9 – 95.4) from a 5% Medicare sample¹
 - Median survival of 3.8 years (95% CI: 3.5 – 3.8)¹
- IPF patients have higher healthcare use than IPF-free controls²
- End-of-life (EoL) care costs are a concern for many illnesses
 - Disproportionate share (14%) of Medicare spending is in last year of life³
 - ***Pattern of EoL care costs among IPF patients is unknown***
- A prior tertiary care center study revealed that a majority of patients with IPF died within a hospital setting with no or late palliative care referral. This suggests a need to promote earlier discussion and referral to palliative care or hospice.⁴

1. Raghu G, Chen S-Y, Yeh W-S, Maroni B, Li Q, Lee Y-C, et al. Idiopathic pulmonary fibrosis in US Medicare beneficiaries aged 65 years and older: incidence, prevalence, and survival, 2001-11. *Lancet Respir Med*. 2014 Jul;2(7):566-72.

2. Wu N, Yu YF, Chuang CC et al. Healthcare resource utilization among patients diagnosed with idiopathic pulmonary fibrosis in the United States. *J Med Econ*. 2015;18(4):249-57.

3. Griffin S, Cubanski J, Neuman T, Jankiewicz A, Rousseau D. Medicare and end-of-life care. *JAMA*. 2016;316(17):1754.

4. Lindell KO, Liang Z, Hoffman LA, Rosenzweig MQ, Saul MI, Pilewski JM, et al. Palliative care and location of death in decedents with idiopathic pulmonary fibrosis. *Chest*. 2015;147(2):423-9.

Research Objectives

- To compare end-of-life (EoL) care costs to earlier (initial and continuing, I/C) care costs for Medicare patients newly diagnosed with IPF
- To understand the components of EoL care costs

Study Design and Patient Selection

- Study designed as retrospective claims analysis of Medicare enrollees newly diagnosed with IPF in 2010
- Patients followed up to 4 years after IPF diagnosis

Patient Selection

Identified 22,421 newly diagnosed IPF patients with ≥ 1 inpatient or ≥ 2 outpatient claims in Y2010 (date of first claim = index date)



Included 22,397 patients ≥ 66 years old at index date



Included 17,536 patients with continuous enrollment in FFS Medicare for ≥ 1 year before index



Included 13,662 patients with no claim codes for “other interstitial lung diseases” after last IPF claim



N = 13,615
Newly diagnosed IPF patients
66 to 97 years at index date

Study Measures

- Outcome: total cost (emergency department, inpatient hospital, skilled nursing facility, hospice, and other outpatient). Cost calculated during 2 phases of care:
 - EoL care phase, defined by quarter prior to death
 - EoL phase length determined empirically based on when costs begin to rise among deceased patients
 - I/C care phase, defined by period prior to EoL phase, starting from IPF diagnosis
- Patient characteristics included age, gender, region, comorbidities, and survival

Analysis

- Total cost compared between EoL and I/C phases of care
- Costs reported overall and for respiratory-related care
- All costs reported quarterly and adjusted for inflation to 2013 costs (last year of study follow-up)

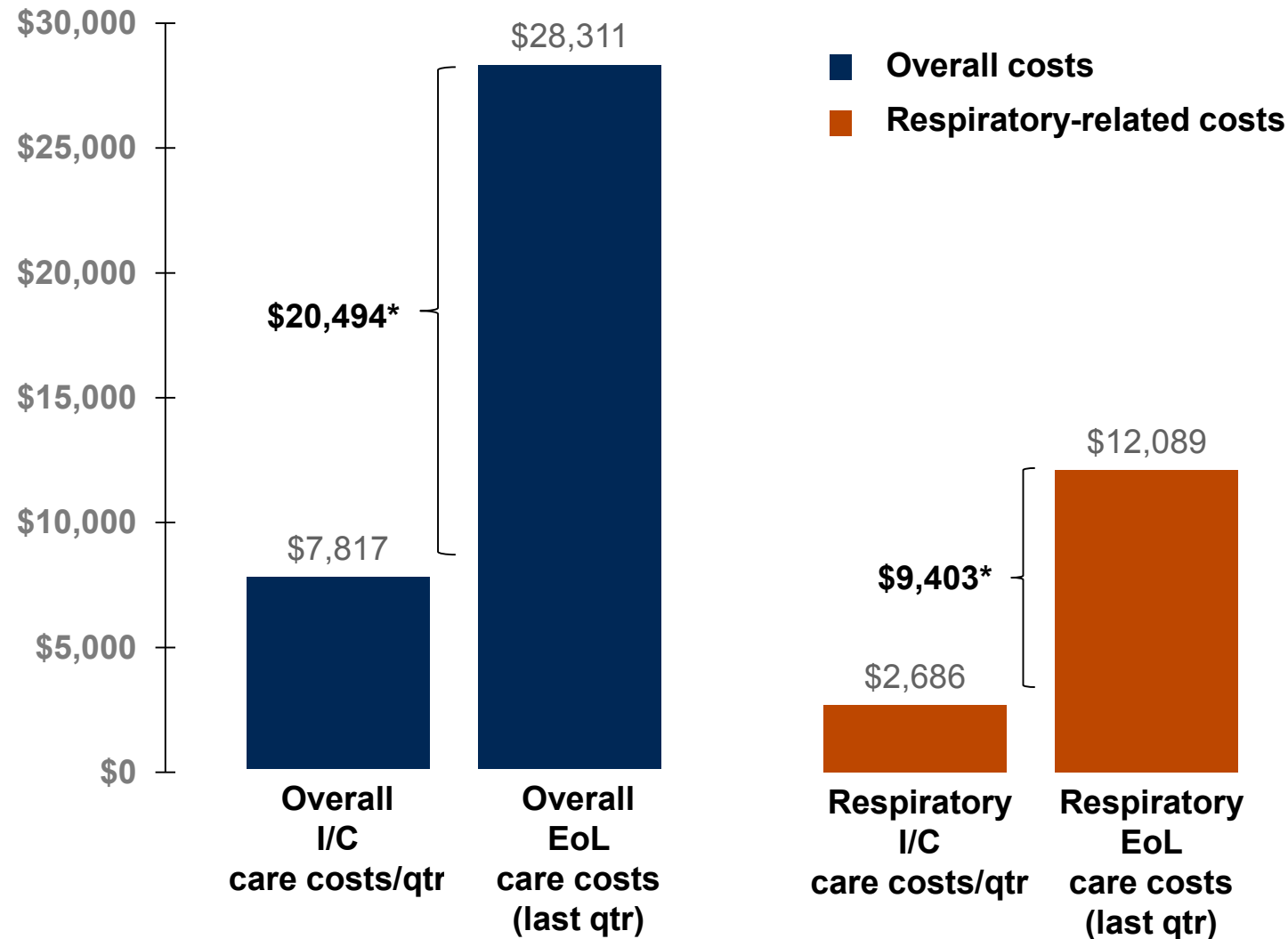
Deceased IPF Patients Older and Predominantly Male

	All IPF Patients N = 13,615	Deceased IPF Patients N = 7,191
Age in years, mean (SD)	78.9 (7.1)	80.3 (7.1)
Female, n (%)	6,768 (49.7)	3,252 (45.2)
Region, n (%)		
Midwest	3,499 (25.7)	1,940 (27.0)
Northeast	2,559 (18.8)	1,397 (19.4)
South	5,238 (38.5)	2,678 (37.2)
West	2,311 (17.0)	1,172 (16.3)
Other/Unknown	8 (0.1)	4 (0.1)
Years of survival since IPF diagnosis, mean (SD)	-	1.3 (1.1)

Deceased IPF Patients Had More Comorbid Conditions

	All IPF Patients N = 13,615	Deceased IPF Patients N = 7,191
Charlson comorbidity index, n (%)	3.6 (2.9)	4.1 (3.2)
No. of chronic conditions, n(%)	6.3 (2.2)	6.5 (2.2)
Cardiovascular conditions, n (%)	9,205 (67.6)	5,381 (74.8)
Pulmonary hypertension	903 (6.6)	595 (8.3)
Ischemic heart disease	6,600 (48.5)	3,870 (53.8)
Congestive heart failure	4,708 (34.6)	3,214 (44.7)
Venous thromboembolism	1,216 (8.9)	751 (10.4)
Stroke	1,047 (7.7)	623 (8.7)
Atrial fibrillation	3,444 (25.3)	2,175 (30.2)
Other conditions, n (%)		
Cor pulmonale	407 (3.0)	286 (4.0)
Depression	862 (6.3)	502 (7.0)
COPD including emphysema	7,039 (51.7)	4,180 (58.1)
Bacterial pneumonia	4,281 (31.4)	2,671 (37.1)
Gastroesophageal reflux	4,201 (30.9)	2,174 (30.2)
Obstructive sleep apnea	1,125 (8.3)	572 (8.0)
Obesity	938 (6.9)	440 (6.1)
Lung cancer	504 (3.7)	361 (5.0)
Pneumothorax	35 (0.3)	27 (0.4)
Dysphagia	1,119 (8.2)	695 (9.7)

End-of-Life Care More Costly than Earlier Phase of Care

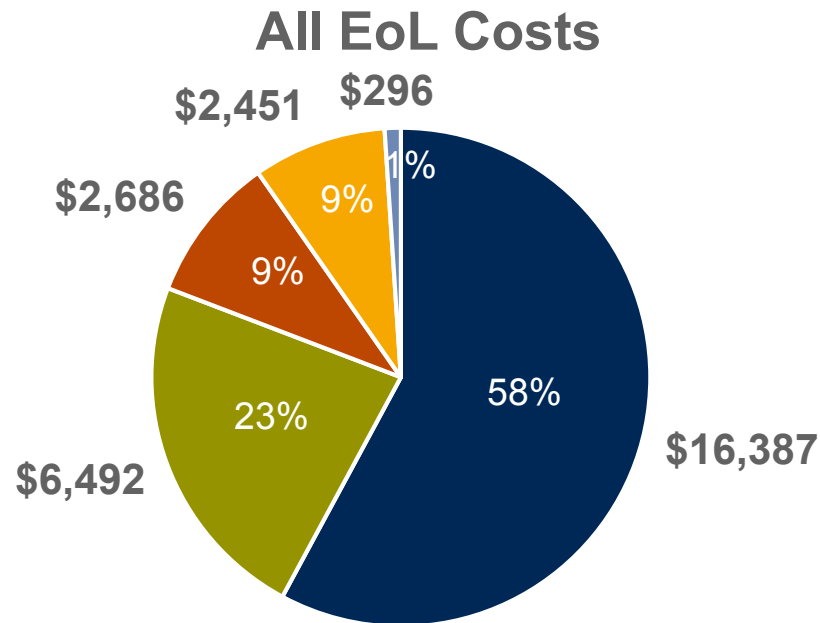


- Cost of EoL care more than triple the cost of earlier (I/C) phase of care, overall (362%) and for respiratory-related services (450%)

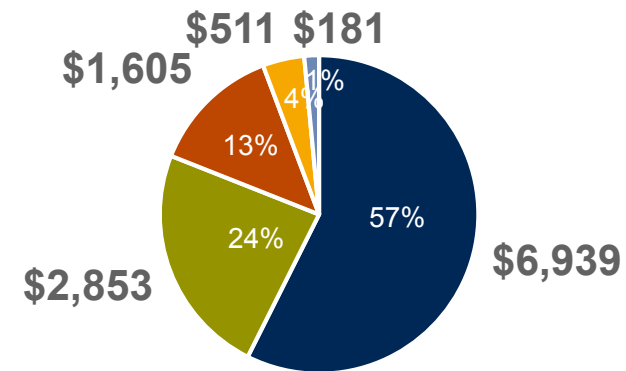
* $P < 0.001$; naïve t-test assuming I/C care costs and EoL care costs are independent.

Inpatient and Outpatient Care Drive End-of-Life Costs

- Inpatient care main driver of EoL costs for IPF patients, followed by other outpatient services
- Respiratory-related costs make up 42% of total costs



Respiratory-related EoL Costs



■ Inpatient ■ Other outpatient ■ Hospice ■ SNF ■ ED

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SNF: Skilled nursing facility; ED: Emergency department

Discussion & Conclusion

- IPF is associated with high mortality, which in turn carries a significant cost burden during last phase of life
- All-cause EoL costs were approximately 3.6 times the quarterly average of I/C costs in IPF patients
- Patients with IPF who become sicker and who die require considerably more resources, both inpatient and outpatient
- Antifibrotic treatment, shown to slow the progression of disease, might change the balance between EoL and I/C costs