Incremental healthcare utilization and cost burden associated with non-IPF chronic fibrosing interstitial lung disease with a progressive phenotype

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INTERACTIVE

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BACKGROUND AND OBJECTIVE

- A subset of patients with chronic fibrosing interstitial lung disease (ILD) will exhibit a progressive phenotype, which is characterized by the development of progressive fibrosis due to a common self-sustaining pathophysiology with associated lung function decline and early mortality[1,2]
- The burden of idiopathic pulmonary fibrosis (IPF) has been documented,[3] but little is known about healthcare resource utilization (HCRU) and costs associated with other forms of progressive fibrosing ILD
- This study examined the HCRU and cost burden among patients with incident progressive vs not-yet-progressed non-IPF chronic fibrosing ILD

METHODS

- **Study design:** Retrospective observational study using administrative claims data from the Optum Research Database
- **Study population:** Insured patients ≥18 years of age and diagnosed with non-IPF fibrosing ILD (≥2 ICD-10 diagnosis codes on separate dates) from 01 Oct 2016 – 30 Jun 2019
- **Study cohorts:** Patients with progression after chronic fibrosing ILD diagnosis (determined via ICD-10 codes; index date is progression date) were 1:1 propensity score matched to not-yet-progressed patients (index date assigned to give same duration from ILD diagnosis date as matched progressive patient and ≥3 months of progression-free follow-up; cohorts not mutually exclusive)
  - Progression criteria included HCRU associated with management of progressive fibrosing ILD
  - Included patients had continuous health plan enrollment for 12 months before and ≥3 months after the index date (baseline and follow-up, respectively); follow-up for matched pairs continued until earliest of disenrollment, evidence of progression for the fibrosing ILD patient, or study end
  - Exclusions: IPF diagnosis (ICD-10 J84.112) during study period, missing demographic information
- **Analysis:** All-cause HCRU and all-cause healthcare costs were calculated as per-patient-per-month (PPPM) measures weighted to account for variable follow-up

STUDY LIMITATIONS

- Findings are most applicable to insured US patients
- Because there was no diagnosis code for chronic progressive fibrosing ILD at the time the study was conducted, proxies were used to identify patients with a progressive phenotype

CONCLUSIONS

- Among real-world patients with newly diagnosed non-IPF chronic fibrosing ILD, those with a progressive phenotype had an increased HCRU and cost burden relative to those who had not yet progressed
- The cost differential was driven primarily by hospitalizations, which were longer and more frequent for progressive patients

RESULTS

Study Sample (Table 1)

- Post-match baseline variables were well balanced (eg, mean age 72.7 vs 73.2 years and 50% vs 48% female for progressive vs not-yet-progressed cohort, respectively)

Table 1. Post-Match Baseline Patient Characteristics

Characteristic	Progressive cohort (n=11,025)[a,b,c]	Not-yet-progressed cohort (n=11,025)	Stand. diff., %[d]
Age, mean (SD)	72.7 (11.2)	73.2 (11.2)	-4.81
Female sex, n (%)	5,512 (50.0)	5,323 (48.3)	3.43
Insurance, n (%)			
Commercial	2,002 (18.2)	1,873 (17.0)	3.07
MAPD	9,023 (81.8)	9,152 (83.0)	-3.07
Comorbidities, n (%)			
COPD	5,722 (51.9)	5,517 (50.0)	3.72
Heart failure	3,049 (27.7)	2,830 (25.7)	4.49
Obstructive sleep apnea	2,122 (19.3)	1,898 (17.2)	5.26
Asthma	1,975 (17.9)	1,874 (17.0)	2.41
Pulmonary hypertension	1,261 (11.4)	1,042 (9.5)	6.50
Annual all-cause HCRU, n (%)[e]			
Ambulatory visit	10,906 (98.9)	10,913 (99.0)	-0.62
ED visit	6,265 (56.8)	6,135 (55.7)	2.38
Hospitalization	3,998 (36.3)	3,690 (33.5)	5.86
Pharmacy fill	10,799 (98.0)	10,824 (98.2)	-1.65
Annual all-cause healthcare costs, 2019 US$	34,447 (68,456)	30,969 (55,169)	5.59

COPD, chronic obstructive pulmonary disease; ED, emergency department; HCRU, healthcare resource utilization; MAPD, Medicare Advantage with Part D; SD, standard deviation; stand. diff., standardized difference

[a]Baseline covariates used in matching included age, sex, region, insurance type, fibrosing ILD diagnosis year, comorbidities, medication use, HCRU, and healthcare costs

[b]Cohorts were not mutually exclusive; not-yet-progressed patients served as controls for multiple progressive patients and were included in the progressive cohort if they subsequently developed progression

[c]Progression criteria included pulmonary function tests, oxygen titration tests, computed tomography scans, use of high-dose oral corticosteroids or new immunosuppressive medications, lung transplant, oxygen therapy, palliative care, and respiratory hospitalization

[d]Standardized differences <10% indicate adequate balance

[e]For each HCRU category, numbers and percentages represent patients with ≥1 encounter

Healthcare Resource Utilization (Table 2)

- All-cause HCRU for all encounter types was higher for progressive vs not-yet-progressed patients; in particular, weighted PPPM hospitalizations were 3-fold higher
- Among patients who were hospitalized, those in the progressive cohort had longer stays (1.6 days vs 1.0 days) compared to not-yet-progressed patients

Healthcare Costs (Figure)

- Weighted PPPM total all-cause costs were 2-fold higher for progressive vs not-yet-progressed patients ($4,382 vs $2,243)
- Costs for progressive patients were higher for all encounter types, with incremental costs dominated by hospitalization costs

Table 2. Follow-up Weighted PPPM All-Cause HCRU Counts

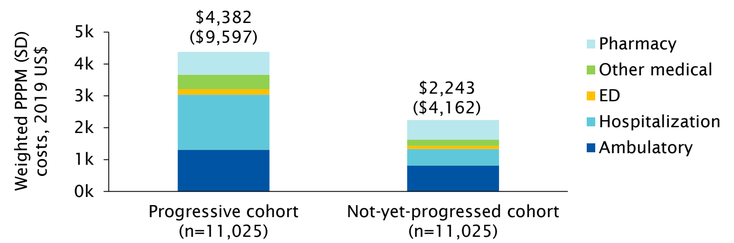
Encounter type	Progressive cohort (n=11,025)	Not-yet-progressed cohort (n=11,025)	P-value[a]
Ambulatory visits (SD)	4.2 (3.6)	3.1 (3.3)	<0.001
Emergency department visits (SD)	0.3 (0.5)	0.1 (0.3)	<0.001
Hospitalizations (SD)	0.1 (0.2)	0.0 (0.1)	<0.001
Inpatient days (SD)[b]	1.6 (2.4)	1.0 (1.3)	<0.001
Pharmacy fills (SD)	4.5 (3.4)	3.9 (3.5)	<0.001

HCRU, healthcare resource utilization; PPPM, per patient per month; SD, standard deviation

[a]P-values calculated using Z-tests with robust standard errors

[b]Among patients with ≥1 hospital stay

Figure. Follow-up Weighted PPPM All-Cause Costs



Total (SD)	$4,382 ($9,597)	$2,243 ($4,162)	p<0.001[a]
Ambulatory	$1,311 ($3,090)	$808 ($2,184)	p<0.001[a]
Hospitalization	$1,729 ($7,557)	$523 ($2,118)	p<0.001[a]
ED	$169 ($380)	$100 ($274)	p<0.001[a]
Other medical[b]	$453 ($1,640)	$196 ($815)	p<0.001[a]
Pharmacy	$720 ($2,097)	$616 ($2,070)	p=0.002[a]

ED, emergency department; PPPM, per patient per month; SD, standard deviation

[a]P-values calculated using Z-tests with robust standard errors

[b]Includes costs such as lab services, durable medical equipment, home health, and long-term care

References: [1]Cottin V et al. *Eur Respir Rev.* 2018;27(150). [2]Diamantopoulos A et al. *Pharmacoeconomics.* 2018;37(7):779-807. [3]Sgalla G et al. *Eur Respir Rev.* 2018;27(150).

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