Insurance Status Affects Long-Term Survival after Lung Transplant in Patients with Cystic Fibrosis

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SCIENTIFIC REGISTRY OF TRANSPLANT RECIPIENTS

Introduction

- Prior research has shown that patients' insurance status at the time of listing for lung transplant affects waitlist and posttransplant survival.
- Research studying waitlist survival found increased waitlist mortality for candidates with Medicaid vs. those with Medicare or private insurance in a univariate survival analysis of 1770 US cystic fibrosis (CF) lung transplant candidates.[1]
- A study of posttransplant survival in adult heart, lung, liver, and renal transplant recipients showed that patients with Medicaid vs. those with private insurance have more severe pretransplant organ failure episodes and worse survival.[2]
- Another study of 11,385 lung transplant recipients focusing on posttransplant survival showed that Medicare and Medicaid patients had 7.0% and 8.1% lower 10-year survival than recipients with private insurance.[3]
- No studies have analyzed the effect of insurance status in the years before listing on waitlist and posttransplant survival for patients with CF.

Objective

- To identify differences in waitlist and posttransplant survival for lung transplant candidates with CF by their insurance status 2 years before listing for lung transplant.

Methods

- We merged the Scientific Registry of Transplant Recipients (SRTR) and Cystic Fibrosis Foundation Patient Registry (CFFPR) to create a novel database to describe pre-listing characteristics of CF patients that may contribute to waitlist and posttransplant mortality.
- CFFPR patients were matched to the SRTR database using a deterministic matching algorithm (name, date of birth, sex, race, date of death, state of residence, and zip code).
- Database linking occurred over 18 matching rounds that were confirmed with visual inspection.
- Cohort: CF candidates aged ≥ 12 years (age at which lung allocation score is applied) who were listed or underwent transplant, 2006-2014.
- We performed univariate Kaplan-Meier survival analyses to detect differences in waitlist and posttransplant survival by insurance status (public, private, unknown). Public insurance status was defined as Medicare or Medicaid.
- Insurance status 2 years before listing and before transplant was obtained from the CFFPR; waitlist death or removal due to illness and posttransplant survival were obtained from the SRTR.

Results

- We identified 2225 waitlist candidates aged ≥ 12 years with CF.
- Of these, 1340 (60%) had private and 633 (28%) had public insurance during the 2 years before listing.
- One-year waitlist survival was similar between private and public insurance groups (78% vs. 76%, log rank $P = 0.359$, Figure 1).
- We identified 1664 lung transplant recipients aged ≥ 12 years with CF and known insurance status in the 2 years before transplant.
- Of these, 1137 (68%) had private and 527 (32%) had public insurance.
- Recipients with private insurance were more often white (96.5% vs. 92.6%) and employed (61.3% vs. 31.5%), and had more post-graduate education (47.4% vs. 16.6%) and relatively fewer exacerbations before transplant (Table).
- One-year posttransplant survival was similar between private and public insurance groups (89% vs. 86%, $P = 0.115$, Figure 2).
- Two-year posttransplant survival was higher for recipients with private insurance than for those with public insurance (80% vs. 72%, $P < 0.0001$, Figure 2).
- Recipients with Medicaid had the lowest survival (69%), compared with recipients with Medicare (75%) and private insurance (80%) (Figure 3).

Demographic and clinical characteristics of transplant recipients by insurance

Characteristic	Level	Private N	Private %	Public N	Public %	P-value
Sex	Female	566	49.8	248	47.1	0.302
	Male	571	50.2	279	52.9	
Race	White	1097	96.5	488	92.6	0.003
	Black	10	0.9	12	2.3	
	Hispanic	29	2.6	24	4.6	
	Other	1	0.1	3	0.6	
BMI (kg/m²)*	< 18.5	397	34.9	185	35.1	0.162
	18.5 - <25	587	51.6	255	48.4	
	25 - <30	44	3.9	19	3.6	
	30+	8	0.7	1	0.2	
	Not computed	101	8.9	67	12.7	
Employment	Employed	601	61.3	133	31.5	<0.0001
	Student/retired/homemaker	147	15.0	55	13.0	
	Unemployed/disabled	232	23.7	234	55.5	

Characteristic	Level	Private N	Private %	Public N	Public %	P-value
Education**	HS or less	64	7.5	36	9.8	<0.0001
	Some college	136	16.0	152	41.4	
	College graduate	226	26.7	116	31.6	
	Post-graduate	402	47.4	61	16.6	
	Unknown	20	2.4	2	0.5	
Oxygen use	Continuous/at rest	136	28.8	164	31.1	0.609
	Exercise/at night	285	25.1	131	24.9	
	With exacerbation	224	19.7	110	20.9	
	Unknown	287	25.2	115	21.8	
CFRD status	Normal glucose metabolism	532	46.8	227	43.1	0.361
	Impaired glucose metabolism	130	11.4	66	12.5	
	CF-related diabetes	475	41.8	234	44.4	
# Exacerbations	0	136	12.0	54	10.2	0.0004
	1-2	330	29.0	127	24.1	
	3-4	308	27.1	121	23.0	
	5+	363	31.9	225	42.7	
FEV1 % predicted (mean)		23.7		23.6		0.805

* BMI computed only for recipients aged 18 years or older

** Education reported for recipients aged 23 years or older

Figure 1: One-Year Waitlist Survival
Private insurance: 78%; public insurance: 76%; $P = 0.359$

Figure 2: Two-Year Posttransplant Survival
Private insurance: 80%; public insurance: 72%; $P < 0.0001$
One-year survival:
Private insurance: 89%; public insurance: 86%; $P = 0.115$

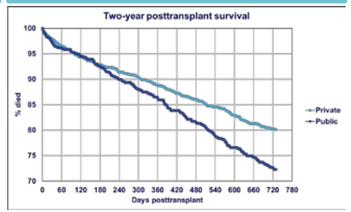
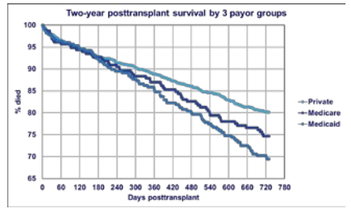


Figure 3: Two-Year Posttransplant Survival by 3 Payers
Private insurance: 80%; Medicare: 75%; Medicaid, 69%; $P < 0.0001$

One-year survival:
Private insurance: 89%; Medicare: 87%; Medicaid: 86%; $P = 0.199$



Conclusions

- CF patients' type of insurance did not affect waitlist or 1-year posttransplant survival in this analysis.
- Transplant recipients with public insurance had an increased risk of mortality at 2 years following lung transplant.
- These findings should be confirmed adjusting for known factors associated with holding public insurance to identify the risk factors for death and possible points of intervention to improve survival of CF patients with public health insurance. Factors known to be associated with insurance status include socioeconomic status, education, employment, race, sex, and geographic region.

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