

Treatment Adherence as a Cost Determinant in Patients with Tuberculosis

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Background & Objectives

Poor adherence to anti-tuberculosis treatment is an essential obstacle to tuberculosis (TB) control. It aims to observe all-cause/TB-related costs by TB treatment adherence and explore the association between medication adherence and medical cost in patients with TB in South Korea.

Methods

- Using claims data from the Korean National Health Insurance Service, we conducted a retrospective cohort study. Newly-treated TB patients were followed up from treatment initiation to death or end of the study (Figure 1).
- Based on the proportion of days covered (PDC), patients were categorized into adherent (PDC ≥ 0.8) and non-adherent (PDC < 0.8) groups.
- We estimated mean all-cause/TB-related cumulative cost per patient with adjusting censored costs. We also obtained monthly costs per patient during treatment and observed treatment outcomes: treatment completion, loss to follow-up from treatment, death during treatment, and initiation of multi-drug resistant TB treatment.
- Relative ratios were estimated to find cost drivers using generalized linear models with adjusting baseline characteristics such as age and sex.

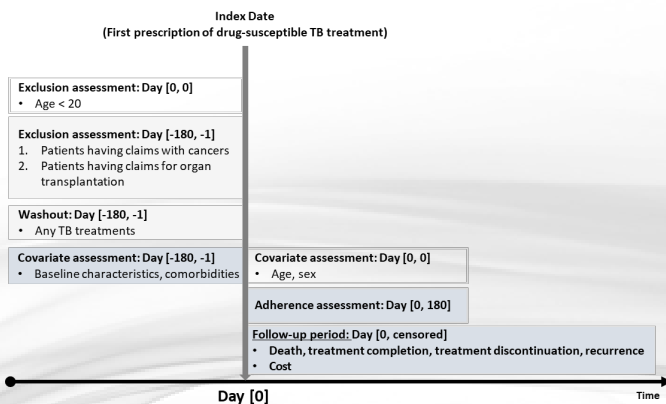


Figure 1 Study design

Result

Of 3,799 newly-treated TB patients, Adherent group were 2,662 (70%) and non-adherent group were 1,137 (30%) (Table 1).

Table 1 Characteristics of target anti-cancer drugs

	Total (n=3,799)	Adherent (n=2,662)	Non-adherent (n=1,137)
Age, mean (SD)	50.25 (18.81)	48.52 (18.25)	54.28 (19.49)
Age, n (%)			
20 to 39	1,310 (34.48)	1,011 (37.98)	299 (26.30)
40 to 59	1,226 (32.27)	851 (31.97)	375 (32.98)
60 to 79	992 (26.11)	667 (25.06)	325 (28.58)
≥ 80	271 (7.13)	133 (5.00)	138 (12.14)
Sex, n (%)			
Female	1,684 (44.33)	1,224 (45.98)	460 (40.46)
Male	2,115 (55.67)	1,438 (54.02)	677 (59.54)
Follow-up period (year), mean (SD)	5.30 (2.21)	5.39 (1.97)	5.10 (2.67)
Treatment regimen, n (%)			
INH+RIF+EMB+PZA (HREZ)	3,473 (91.42)	2,472 (92.86)	1,001 (88.04)
INH+RIF+EMB (HRE)	255 (6.71)	148 (5.56)	107 (9.41)
INH+RIF+PZA (HRZ)	50 (1.32)	30 (1.13)	20 (1.76)
INH+EMB+PZA	11 (0.29)	6 (0.23)	5 (0.44)
RIF+EMB+PZA	8 (0.21)	5 (0.19)	3 (0.26)
EMB+PZA+ rifabutin	1 (0.03)	1 (0.04)	-
INH+ EMB+PZA+ rifabutin	1 (0.03)	-	1 (0.09)
Type of insurance, n (%)			
Health insurance	3,499 (92.1)	2,505 (94.1)	994 (87.42)
Medical aid	300 (7.90)	157 (5.90)	143 (12.58)
Comorbidity, n (%)			
Interstitial pulmonary diseases	1,303 (34.30)	930 (34.94)	373 (32.81)
COPD	272 (7.16)	176 (6.61)	96 (8.44)
Other respiratory disease	34 (0.89)	22 (0.83)	12 (1.06)
Diabetes	592 (15.58)	370 (13.90)	222 (19.53)
Mild liver disease	568 (14.95)	386 (14.50)	182 (16.01)
Moderate or severe liver disease	19 (0.50)	16 (0.60)	3 (0.26)
Renal failure	70 (1.84)	41 (1.54)	29 (2.55)
Chronic kidney disease	12 (0.32)	4 (0.15)	8 (0.70)
CCI, n (%)			
0	1,497 (39.41)	1,072 (40.27)	425 (37.38)
1	1,048 (27.59)	759 (28.51)	289 (25.42)
2	570 (15.00)	385 (14.46)	185 (16.27)
≥ 3	684 (18.00)	446 (16.75)	238 (20.93)

During five years, all-cause costs were US\$ 10,270 in the adherent group and US\$ 10,474 in the non-adherent group, while TB-related costs were US\$ 2,270 and US\$ 2,694, respectively. Medication was the biggest proportion in all-cause/TB-related costs ranging from 30 to 33% in adherent and non-adherent groups.

Monthly all-cause costs per patient during the treatment were also higher in the non-adherent group comparing with the adherent group (US\$ 1,066 vs. US\$ 2,804). The adherent group spent less on TB-related costs (relative ratio=0.89, 95% CI 0.92-0.98). Patients who lost to follow-up for treatment spent more TB-related costs (2.52, 2.24-2.83) (Table 2).

Table 2 Factors associated with monthly cost per patient

	Relative ratio (95% CI)	
	Total cost	TB-related cost
Adherence (vs. non-adherent, PDC<0.8)		
Adherent (PDC ≥ 0.8)	0.94 (0.86-1.02)	0.89 (0.82-0.98)
Treatment outcomes (vs. Treatment completion)		
Loss to follow-up from treatment	2.48 (2.23-2.76)	2.52 (2.24-2.83)
Death during treatment	5.24 (4.51-6.09)	6.30 (5.34-7.42)
Initiation of MDR TB treatment	4.64 (3.48-6.19)	5.67 (4.14-7.77)
Age at index date (vs. age≥ 80)		
20 to 39	0.47 (0.41-0.53)	0.53 (0.46-0.60)
40 to 59	0.62 (0.55-0.70)	0.61 (0.53-0.69)
60 to 79	0.84 (0.75-0.95)	0.82 (0.72-0.94)
Sex		
Male (vs. female)	1.15 (1.09-1.22)	1.21 (1.14-1.29)
Type of insurance		
Health insurance (vs. medical aid)	0.77 (0.69-0.85)	0.88 (0.78-0.98)
CCI (vs. CCI=0)		
1	1.11 (1.02-1.21)	1.17 (1.06-1.28)
2	1.15 (1.03-1.29)	1.08 (0.96-1.22)
≥ 3	1.48 (1.29-1.69)	1.41 (1.22-1.63)
Type of index provider (vs. Tertiary hospital)		
General hospital	0.93 (0.87-0.99)	0.92 (0.86-0.99)
Hospital	0.94 (0.85-1.03)	0.92 (0.83-1.01)
Clinic etc.	0.37 (0.33-0.40)	0.27 (0.24-0.30)
Comorbidity (vs. without condition)		
Interstitial pulmonary diseases	0.86 (0.79-0.93)	0.87 (0.80-0.94)
COPD	1.10 (0.98-1.23)	1.17 (1.03-1.33)
Other respiratory disease	0.94 (0.70-1.27)	0.87 (0.63-1.20)
Diabetes	1.11 (1.01-1.22)	1.12 (1.01-1.24)
Mild liver disease	1.05 (0.96-1.14)	1.06 (0.97-1.17)
Moderate or severe liver disease	0.79 (0.53-1.17)	0.65 (0.42-0.99)
Renal failure	2.71 (2.15-3.41)	2.47 (1.92-3.18)
Chronic kidney disease	1.33 (0.77-2.28)	1.46 (0.81-2.61)

Conclusion

Non-adherent TB patients spend more cost on TB treatment. Therefore, improving patient adherence may lead to good treatment outcomes and a saving social budget.