

## Factors Associated With a Long Mean Hospital Stay in Patients Hospitalized With Tuberculosis\*



### Factores asociados con estancia media prolongada en pacientes ingresados por tuberculosis

To the Editor,

Tuberculosis (TB) is still a public health issue that affects a large number of individuals and generates high healthcare costs.<sup>1–3</sup> Moreover, hospital stays in patients with TB tend to be prolonged; over 15 days in most cases.<sup>2,3</sup> In Spain, between 1999 and 2009, mean hospital stay was 14 days with a standard deviation of 12 days.<sup>3</sup>

Very few studies have been conducted in Spain to explain the reasons for these prolonged mean stays. The aim of this study was to analyze TB patients who were admitted to hospital for mean stays of longer than 15 days, and to evaluate the associated factors.

This was a retrospective observational study analyzing all patients admitted for TB between January 2005 and August 2012 in the Hospital General Universitario Reina Sofía, Murcia.

On the basis of data published by Thomas et al.,<sup>4</sup> mean stay was considered prolonged if it was longer than 15 days.

The analysis included 165 patients. Mean patient age was 37.69 (14.42) years, 66% were men, 66% immigrants, 78.2% had pulmonary TB, 21.8% had extrapulmonary TB, and 22.4% presented complications during admission.

Mean stay of all TB patients was 21.94 (29.7) days, median 15 (IQR, 11–24) days, and longer than 15 days in 54.5% of patients. Mean stay of patients with pulmonary tuberculosis was 18 (12.21) days, median 14 days (IQR, 11–22).

Table 1 shows the univariate analysis of factors associated with prolonged mean stay ( $\geq 15$  days).

Variables associated independently with prolonged mean stay in the logistic regression analysis were delayed diagnosis (health system delay) beyond the fourth day (OR 17.94; 95% CI 3.47–92.79;  $P=.001$ ), complications during admission (OR 7.87; 95% CI 2.63–23.8;  $P<.005$ ), history of bronchial disease (OR 6.21; 95% CI 1.17–33.3;  $P=.031$ ) and weight loss, weakness/asthenia and anorexia at time of presentation (OR 3.89; 95% CI 1.83–8.26;  $P<.005$ ) or bilateral involvement (OR 2.64; 95% CI 1.25–5.58;  $P=.011$ ).

The most important factor associated with prolonged stay was delayed diagnosis, to the extent that a delay beyond the fourth day increased by 18-fold the probability of stays longer than 15 days.

Delayed diagnosis, moreover, helps keep tuberculosis endemic,<sup>5–7</sup> and it can also increase morbidity and mortality,<sup>8</sup> and extend hospital stay,<sup>5–9</sup> underlining the importance of early diagnosis and the implementation of preventive measures.

Factors that influence this delay are wide-ranging, but, as we found in our study, advanced age, extrapulmonary involvement, disease site other than the upper lobes, and a negative Ziehl sputum test are determinant factors.<sup>6–8</sup>

Complications during hospitalization have also been described as a key factor in prolonging mean hospital stay.<sup>8,10,11</sup> Complications most commonly observed were toxicities associated with anti-tuberculous drugs (mainly liver involvement), and the need for major surgery in patients with extrapulmonary TB.

Other factors associated with prolonged stay were a history of bronchial disease (risk factor for developing TB and complications<sup>1,8,10</sup>), while bilateral involvement with asthenia,

**Table 1**

Univariate Analysis of Factors Associated With Mean Hospital Stay  $\geq 15$  Days.

	<15 days N=75	$\geq 15$ days N=90	Significance
Age, years	34.25 (11.82)	40.56 (17.43)	0.007
Male sex (%)	53 (70.7)	59 (65.6)	0.484
Immigration (%)	53 (70.7)	56 (62.2)	0.254
Predisposing factors (%)	37 (50)	58 (64.4)	0.062
HIV infection (%)	5 (6.7)	7 (7.8)	0.784
Homeless (%)	6 (8.1)	13 (14.4)	0.207
Alcoholism (%)	12 (16.2)	23 (25.6)	0.146
History of bronchial disease (%)	2 (2.7)	12 (13.3)	0.015
Hemoptysis (%)	28 (37.3)	16 (17.8)	0.005
Asthenia, anorexia, and weight loss (%)	26 (34.7)	54 (60)	0.001
Sepsis (%)	6 (8)	15 (16.7)	0.096
APACHE II	1.6 (3.09)	3.05 (3.8)	0.012
Bilateral involvement (%)	24 (32)	46 (51.1)	0.013
Extrapulmonary involvement (%)	10 (13.3)	26 (28.9)	0.016
Pleural effusion (%)	8 (10.7)	19 (21.1)	0.071
Bacilliferous on admission (%)	40 (52)	51 (58.4)	0.754
Drug resistance (%)	10 (19.2)	18 (27.3)	0.308
Complications (%)	5 (6.7)	32 (35.6)	<0.001
CCI	-0.77 (0.95)	0.96 (3.44)	0.058
UCI admission (%)	2 (2.7)	2 (2.2)	0.853
Lost-to-follow-up (%)	18 (24.3)	35 (38.9)	0.047
Cure (%)	54 (91.5)	49 (74.2)	0.011 (of n=125)
Relapse (%)	5 (9.3)	13 (19.7)	0.069
Death (%)	3 (5)	6 (9.1)	0.373
Delayed diagnosis, days	1 (3.7)	3.6 (7.27)	0.01

CCI: Charlson comorbidity index; ICU: intensive care unit.

anorexia, and weight loss are associated with more severe disease,<sup>1</sup> leading to a longer mean stay.

It is interesting to point out that a hospital stay of longer than 15 days is not an isolated problem in our center; it also occurs in other Spanish hospitals. Indeed, the analysis of the minimum basic data set of discharges from Internal Medicine departments of the Spanish National Health System in 2005–2010 showed that the mean stay was 18.7 days (range 19–44), with 17.8 (SD 19.3) days for patients with extrapulmonary tuberculosis, 18 (SD 22.25) days for patients with pulmonary tuberculosis, and 24.7 (SD 22) days for patients with disseminated disease.<sup>3</sup>

One of the main reasons for keeping patients hospitalized for such long periods is to avoid propagation of the TB. However, the risk of propagation is not reduced by hospitalization, since exposure occurs before diagnosis, and the risk of contagion falls dramatically after treatment is started.<sup>12–14</sup> In a study performed in New York, up to 40% of hospitalizations were found to be inappropriate on this basis.<sup>4</sup>

Hospitalization, and particularly long hospitalization, is not always necessary.<sup>4,14</sup> It is generally an inefficient use of resources and probably up to 20%–40% of admissions among TB patients could be avoided.<sup>4</sup>

In conclusion, most patients admitted with TB have a prolonged mean stay ( $\geq 15$  days) associated with delayed diagnosis, asthenia, anorexia, and weight loss, previous bronchial disease, bilateral involvement, and complications during admission.

The most important factor for prolonging mean hospital stay in these patients was delayed diagnosis, so it is essential that the optimal measures for avoiding this delay are implemented,

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including improved TB education for physicians and the general public (in order to increase the diagnostic suspicion), and better access to the health system. We also believe that a large number of TB patients could benefit from outpatient treatment, reducing the length of hospital stay, or even avoiding hospitalization altogether. This would require, most importantly, the use of standardized protocols, improved health education among patients and family members about isolation measures in the home and treatment compliance, and multidisciplinary teams for supervised outpatient treatment or directly observed therapy.<sup>15</sup>

## References

- Zumla A, Raviglione M, Hafner R, von Reyn CF. Current concepts tuberculosis. *N Engl J Med*. 2013;368:745–55.
- Culqui DR, Rodríguez-Valín E, Martínez de Aragón MV. Epidemiología de las hospitalizaciones por tuberculosis en España: análisis del conjunto mínimo básico de datos 1999–2009. *Enferm Infecc Microbiol Clin*. 2015;33:9–15.
- Zapatero A, Vergas J, Ropero G, Méndez M, Plaza S, Cuervo C, et al. Análisis de la Infección tuberculosa en los servicios de Medicina Interna españoles. Período 2005–2010. *Rev Clin Esp*. 2013;213:102 [Espec Congr].
- Thomas JA, Laraque F, Munsiff S, Piatek A, Harris TG. Hospitalizations for tuberculosis in New York City: how many could be avoided? *Int J Tuberc Lung Dis*. 2010;14:1603.
- Dehghani K, Allard R, Gratton J, Marcotte L, Rivest P. Trends in duration of hospitalization for patients with tuberculosis in Montreal, Canada from 1993 to 2007. *Can J Public Health*. 2011;102:108–11.
- Sreeramareddy CT, Panduru KV, Menten J, van den Ende J. Time delays in diagnosis of pulmonary tuberculosis: a systematic review of literature. *BMC Infect Dis*. 2009;9:91.
- Li Y, Ehiri J, Tang S, Li D, Bian Y, Lin H, et al. Factors associated with patient, and diagnostic delays in Chinese TB patients: a systematic review and meta-analysis. *BMC Med*. 2013;11:156.
- Zetola NM, Macesic N, Shin SS, Peloso A, Ncube R, Klausner JD, et al. Longer hospital stay is associated with higher rates of tuberculosis-related morbidity and mortality within 12 months after discharge in a referral hospital in Sub-Saharan Africa. *BMC Infect Dis*. 2014;14:409.
- Altet Gómez MN, Alcaide Megías J, Canela Soler J, Milá Augé C, Jiménez Fuentes MA, de Souza Galvao ML, et al. Estudio del retraso diagnóstico de la tuberculosis pulmonar sintomática. *Arch Bronconeumol*. 2003;39:146–52.
- Singleton L, Turner M, Haskal R, Etkind S, Tricarico M, Nardell E. Long-term hospitalization for tuberculosis control. Experience with a medical-psychosocial inpatient unit. *JAMA*. 1997;278:838–42.
- Rao VK, Iademarco EP, Fraser VK, Kollef MH. The impact of comorbidity on mortality following in-hospital diagnosis of tuberculosis. *Chest*. 1998;114:1244–52.
- Sepkowitz Kent A. How contagious is tuberculosis? *Clin Infect Dis*. 1996;23:954–62.
- Ramos JM, Masiá M, Rodríguez JC, Padilla I, Soler MJ, Gutiérrez F. Tuberculosis in immigrants: clinical and epidemiological differences as compared to the native population (1999–2002). *Enferm Infecc Microbiol Clin*. 2004;22:315–8.
- Masuyama H, Igari H. Reconsideration of the admission and discharge criteria of tuberculosis patients in Japan. *Kekkaku*. 2013;88:373–85.
- World Health Organization. What is DOTS? A guide to understanding the WHO-recommended TB control strategy known as DOTS. Geneva, Switzerland: World Health Organization; 1999.

María del Carmen Vera Sánchez-Rojas,<sup>a,\*</sup> Emma Muñoz Pérez,<sup>a</sup> Ángeles Muñoz Pérez,<sup>b</sup> Salvador Valero Cifuentes,<sup>a</sup> Eva García Villalba,<sup>a</sup> María de la Paz Egea Campoy,<sup>a</sup> Alfredo Cano Sánchez,<sup>b</sup> Enrique Bernal Morell<sup>b</sup>

<sup>a</sup> Servicio de Medicina Interna, Hospital General Universitario Reina Sofía, Murcia, Spain

<sup>b</sup> Sección de Enfermedades Infecciosas, Servicio de Medicina Interna, Hospital General Universitario Reina Sofía, Murcia, Spain

\* Corresponding author.

E-mail address: [mcvsr75@hotmail.com](mailto:mcvsr75@hotmail.com) (M.d.C.V. Sánchez-Rojas).

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