Burden of Tuberculosis Hospitalizations in Portugal From 2000 to 2015

Hospitalizaciones por tuberculosis en Portugal entre 2000 y 2015

Dear Editor,

Tuberculosis (TB) is a major public health problem caused by infection with *Mycobacterium tuberculosis*, or rarely with certain other species of *Mycobacterium*.[1] Worldwide, TB causes more deaths than any other infectious disease and World Health Organization (WHO) TB data for 2015 indicated there were 10.4 million new cases and 1.8 million deaths.[2]

In Europe, the incidence of TB has decreased at an average rate of 5.0% per year since 2001, and Europe has the lower TB burden comparing to other continents.[3,4] The same has happened in Portugal with a steady decrease of the incidence in the last years. However, Portugal had the highest incidence rate and prevalence among western European countries in 2015.[5]

Despite abundant epidemiological data, no studies, to the best of our knowledge, have yet examined the clinical, geographic, and epidemiologic burden of TB hospitalizations in Portugal and their changes over time, instead other European countries, like Spain,[6] France and Italy.[7] Our purpose was to identify the characteristics of patients hospitalized with TB in the public hospitals of mainland Portugal between 2000 and 2015.

This retrospective observational study used data from the nation-wide hospitalization database of Portugal, provided by the Central Administration of Health System of the Portuguese Ministry of Health (ACSS, IP). These data include administrative and clinical data of hospitalization episodes in mainland Portuguese public hospitals over a period of sixteen years (discharges between 2000 and 2015). Data from private hospitals is not part of this database. The records of all inpatients with a principal or secondary diagnosis of TB (coded as 010.xx • 018.xx) were examined. Principal diagnosis represents the clinical condition responsible for the hospitalization and secondary diagnosis describes those conditions that coexists at the time of admission, or develops subsequently, and that affect the patient care for the current episode. Each hospitalization and readmission was considered an independent episode. The anonymity of all patients was maintained during the analysis of the database.

For each hospitalization episode, the following variables were analyzed: sex, birth date, comorbidities (e.g. HIV co-infection), length of stay (LoS), patient residence, and discharge status. There were no age restrictions, and patients were divided into 6 age groups (≤5 years; 6•15 years; 16•25 years; 26•45 years; 46•65 years, and >65 years). Birth date was unavailable for one episode. TB hospitalization rate per 100,000 people and mortality indicators [in-hospital death and in-hospital premature death, in-hospital mortality rate and Potential Years of Life Lost (PYLL)] were calculated.

There were 47,997 hospitalizations for TB in the public hospitals of mainland Portugal from 2000 to 2015 (Table 1), with 58.7% (n = 28,171) for principal TB episodes and the other 41.3% for secondary diagnosis. HIV infection (n = 48.3%), pneumonia (except that caused by tuberculosis or sexually transmitted disease) (n = 5.5%) and chronic obstructive pulmonary disease and bronchiectasis (n = 2.1%) are the most common secondary diagnosis for TB hospitalization.

The overall hospitalization rate during this time was 30.1/100,000/year, and this number decreased by 58.8% during the study period (2000: 42.7/100,000; 2015: 17.6/100,000).

Individuals 26•45 years old had the highest overall hospitalization rate (43.8/100,000/year; Table 1), and the hospitalization rate in this group decreased by 74.1% during the study period (2000: 69.0/100,000; 2015: 17.9/100,000). The overall hospitalization rate was greater for males (45.0/100,000/year) than females (16.4/100,000/year). Moreover, the hospitalization rates declined over time for both sexes (males: 64.3/100,000 in 2000 to 26.1/100,000 in 2015; females: 22.4/100,000 in 2000 to 9.9/100,000 in 2015) (Table 1).

Pulmonary TB (011.x) was the most common type of TB (66.4%), followed by other respiratory TB (012.x) (12.5%). Primary TB infection (010.x) accounted for only 1.8% of all admissions (Table 1).

A total of 12,911 TB patients were HIV co-infected (26.9% of all TB hospitalizations) (Table 1). In males, simultaneous HIV and TB accounted for 78.7% of all TB admissions.

The in-hospital mortality rate was 10.7%, corresponding to 5148 in-hospital deaths (Table 1). A total of 38.7% of these cases (1991 episodes) presented with TB as the main diagnosis and 78.6% were males (4,046 episodes). The in-hospital mortality rate was higher in the elderly (>65 years old).

We also examined the geographic distribution of TB hospitalizations using the NUTS II classification (Table 1). Lisbon had the highest rate of TB hospitalizations, followed by the North. Lisbon and Porto had the highest age-standardized TB hospitalization rates, 46.0/100,000 and 38.4/100,000, respectively. Moreover, during the 16 year study period, all districts had declining hospitalization rates, except for Castelo Branco, which had an increase of 20% between 2000 and 2015 (2000: 36.8/100,000; 2015: 41.3/100,000). Castelo Branco had the highest TB hospitalization age-standardized rate in Portugal in 2015.

Interestingly, we also found a trend for decreasing TB hospitalizations over time. Up until 2007, the TB hospitalization rate was close to or a bit higher than the TB notification rate, and clearly higher than the TB incidence rate. However, after 2007, the TB hospitalization rate decreased more rapidly than the notification and incidence rates. This suggests a change in the criteria used for TB hospitalization.

These results highlight that TB continues to be a major public health problem in Portugal that requires more attention. Further studies should focus on the criteria used for TB hospitalization and its impact on outcome, and the reason for the high TB hospitalization rate in Castelo Branco.

Table 1
Clinical and demographic characteristics of TB hospitalizations in Portugal, between 2000 and 2015.

	Total	HIV	Non-HIV	2000	2005	2010	2015
Total Hospitalizations	47,997	12,911	35,086	4199	3452	2307	1728
Hospitalization Rate (hospitalization/100,000inhabitants)	30.1	•	•	42.7	34.5	22.9	17.6
Gender (Male)	34,396	10,158	24,238	3056	2552	1636	1217
Hospitalization Rate (hospitalization/100,000inhabitants)	45.0	•	•	64.3	53.0	34.0	26.1
HIV	12,911	•	•	1316	1066	535	292
LOS, median (days)	16	19	15	16	16	16	15
Mean Age (SD)	46.9 (19.3)	38.5 (10.3)	50.0 (20.9)	43.9 (19.5)	45.3 (18.6)	48.7 (19.5)	52.5 (20.1)
Age Group (years)							
≤5 years	713	20	693	86	73	22	24
Hospitalization Rate (hospitalization/100,000inhabitants)	7.6	•	•	13.9	11.6	3.8	4.7
6•15 years	837	12	825	57	73	48	20
Hospitalization Rate (hospitalization/100,000inhabitants)	5.0	•	•	5.3	6.9	4.6	2.0
16•25 years	3737	730	3007	442	247	163	131
Hospitalization Rate (hospitalization/100,000inhabitants)	19.7	•	•	30.6	20.1	14.9	12.8
26•45 years	20,348	9508	10,840	1988	1588	889	476
Hospitalization Rate (hospitalization/100,000inhabitants)	43.8	•	•	69.0	52.9	30.4	17.9
46•65 years	12,454	2374	10,080	855	868	675	587
Hospitalization Rate (hospitalization/100,000inhabitants)	30.8	•	•	37.0	35.6	25.6	21.7
>65 years	9907	266	9641	771	603	510	490
Hospitalization Rate (hospitalization/100,000inhabitants)	35.9	•	•	50.9	36.4	28.5	25.1
Types of Tuberculosis							
010.x Primary Tuberculous infection	870	79	791	79	67	41	55
011.x Pulmonary tuberculosis	31,854	7686	24,168	2777	2310	1526	1096
012.x Other respiratory tuberculosis	5947	918	5029	563	424	290	210
013.x Tuberculosis of meninges and central nervous system	1741	868	873	164	143	81	67
014.x Tuberculosis of intestines peritoneum and mesenteric glands	1089	266	823	73	70	51	52
015.x Tuberculosis of bones and joints	1788	212	1576	186	110	107	83
016.x Tuberculosis of genitourinary system	1063	130	933	76	87	59	49
017.x Tuberculosis of other organs	3771	1533	2238	295	241	198	147
018.x Miliary tuberculosis	3819	2783	1036	304	306	172	129
In-hospital mortality							
%	10.7	16.1	8.7	12.0	11.5	10.7	9.7
N	5148	2078	3070	502	398	246	167
In-hospital premature deaths	4086	2052	2034	418	332	179	111
Total PYLL	110,960	72,837	28,122	•	•	•	•
Age-adjusted PYLL Rate	64.2	47.3	22.0	•	•	•	•
Unplanned Admissions (%)	82.1	81.8	82.2	86.5	80.5	82.2	82.6
Discharges to							
Home	37,171	8890	28,281	3141	2609	1826	1421
Another institution with hospitalization	4245	1260	2985	413	343	168	84
Domiciliary Service	146	17	129	15	11	18	5
Without authorized medical opinion	1146	632	514	128	91	49	27
NUTS II							
North	17,116	3753	13,363	1554	1268	751	579
Hospitalization Rate (hospitalization/100,000inhabitants)	29.0	•	•	42.2	34.1	20.3	16.1
Center	6893	918	5975	526	500	367	292
Hospitalization Rate (hospitalization/100,000inhabitants)	18.5	•	•	22.4	21.3	15.7	12.9
Lisbon	19,094	7067	12,027	1710	1348	939	669
Hospitalization Rate (hospitalization/100,000inhabitants)	43.1	•	•	64.5	49.1	33.3	23.8
Alentejo	2179	323	1856	159	169	125	94
Hospitalization Rate (hospitalization/100,000inhabitants)	17.9	•	•	20.5	21.9	16.5	13.0
Algarve	1924	543	1381	180	119	92	80
Hospitalization Rate (hospitalization/100,000inhabitants)	28.0	•	•	45.8	28.1	20.4	18.1

Acknowledgements

The authors would like to thank the Portuguese Ministry of Health's Authority for Health Services (Administração Central do Sistema de Saúde I.P. • ACSS) for providing access to national hospitalizations data.

We would also like to thank H. Gonçalves, for the elaboration of the maps.

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1579-2129/