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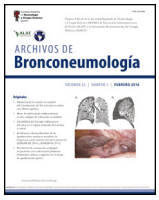

Original Article

Tuberculosis Costs in Spain and Related Factors☆

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ABSTRACT

Objective: To analyze the direct and indirect costs of diagnosis and management of tuberculosis (TB) and associated factors.

Patients and methods: Prospective study of patients diagnosed with TB between September 2014 and September 2015. We calculated direct (hospital stays, visits, diagnostic tests, and treatment) and indirect (sick leave and loss of productivity, contact tracing, and rehabilitation) costs. The following cost-related variables were compared: age, gender, country of origin, hospital stays, diagnostic testing, sensitivity testing, treatment, resistance, directed observed therapy (DOT), and days of sick leave. Proportions were compared using the chi-squared test and significant variables were included in a logistic regression analysis to calculate odds ratio (OR) and corresponding 95% confidence intervals.

Results: 319 patients were included with a mean age of 56.72±20.79 years. The average cost was €10,262.62±14,961.66, which increased significantly when associated with hospital admission, polymerase chain reaction, sputum smears and cultures, sensitivity testing, chest computed tomography, pleural biopsy, drug treatment longer than nine months, DOT and sick leave. In the multivariate analysis, hospitalization (OR=96.8; CI 29–472), sensitivity testing (OR=4.34; CI 1.71–12.1), chest CT (OR=2.25; CI 1.08–4.77), DOT (OR=20.76; CI 4.11–148) and sick leave (OR=26.9; CI 8.51–122) showed an independent association with cost.

Conclusion: Tuberculosis gives rise to significant health spending. In order to reduce these costs, more control of transmission, and fewer hospital admissions would be required.

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Costes de la tuberculosis en España: factores relacionados

Palabras clave:
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R E S U M E N

Objetivo: Analizar los costes directos e indirectos derivados del diagnóstico y tratamiento de la tuberculosis (TB) y sus factores asociados.
Pacientes y métodos: Estudio prospectivo de pacientes diagnosticados de TB entre septiembre de 2014 y septiembre de 2015. Se calcularon los costes directos (estancias hospitalarias, consultas, estudios diagnósticos y tratamiento), e indirectos (absentismo laboral y pérdida de productividad, estudio de contactos y medidas rehabilitadoras). Los costes se compararon atendiendo a las variables: edad, sexo, país de origen, ingreso hospitalario, pruebas diagnósticas, tratamiento, resistencia farmacológica, tratamiento directamente observado (TDO) y días de baja laboral. Se compararon proporciones mediante Chi cuadrado y las variables significativas se incluyeron en un modelo de regresión logística calculándose las *odds ratio* (OR) y sus correspondientes intervalos de confianza del 95% (IC).
Resultados: Fueron incluidos 319 pacientes con una edad media de 56,72±20,79 años. El coste medio fue de 10.262,62±14.961,66 €, y aumentaba significativamente en relación con el ingreso hospitalario, el uso de la PCR, la realización de baciloscopia y cultivo, antibiograma, tomografía axial computarizada de tórax, biopsia pleural, tratamiento de más de 9 meses, TDO y baja laboral. En el análisis multivariante mantenían asociación independiente: ingreso hospitalario (OR=96,8; IC: 29-472,3), antibiograma (OR=4,34; IC: 1,71-12,1), tomografía axial computarizada de tórax (OR=2,25; IC: 1,08-4,77), TDO (OR=20,76; IC: 4,11-148) y baja laboral (OR=26,9; IC: 8,51-122).
Conclusión: La Tuberculosis acarrea un gasto sanitario significativo. Medidas dirigidas a mejorar el control de la enfermedad y disminuir los ingresos hospitalarios serían importantes para reducirlo.

Introduction

Tuberculosis (TB) continues to be the most common global disease, causing 1.5 million deaths in 2014, with approximately 9.6 million new cases occurring every year.[1] In Spain, according to data from the Epidemiological Surveillance Network,[2] 5018 cases of TB were notified via the individualized mandatory reporting system in 2014, 3933 of which were classified as respiratory tuberculosis, with an incidence rate of 10.80 cases per 100,000 inhabitants. However, a study recently conducted by the Integrated Tuberculosis Research Program (PII TB) of the Spanish Society of Pulmonology and Thoracic Surgery (SEPAR)[3] revealed significant under-reporting, ranging from 0% to 40% depending on the hospital, with a mean under-reporting rate of 14.4%.

The TB patient population worldwide and in Spain generates economic and social problems, giving rise to direct costs in the form of healthcare spending, and indirect costs, primarily in the form of days of work lost, and even years of life lost.[4] Moreover, TB affects the working population and individuals with all kinds of difficulties (immigrants, HIV-infected individuals), so its socioeconomic impact is significant. Few studies have been published in Spain on the costs of TB,[5–8] and those that have appeared are limited by their exclusive focus on hospitalization costs.

Our aim, then, was to analyze costs derived from the diagnosis and follow-up of TB and associated factors.

Patients and Methods

Design

Prospective observational multicenter study.

Population

Patients with a diagnosis of TB registered in the SEPAR PII TB database between September 2014 and September 2015. Nineteen hospitals participated in 9 autonomous communities, and the cases were distributed according to the percentages shown in Fig. 1.

Informed consent was obtained from all subjects before inclusion, and the study was approved by the Regional Clinical Research Ethics Committee of the Principality of Asturias.

Inclusion Criteria

Patients were at least 18 years of age with a diagnosis of TB according to the following criteria:

(1) Positive or negative sputum smear with *Mycobacterium tuberculosis* isolated from culture medium.
(2) Caseifying granulomas detected in cases of extrapulmonary TB.
(3) Patients with clinical, radiological, epidemiological and/or laboratory suspicion justifying, in the opinion of the physician, anti-tuberculosis treatment.

All patients attended at least 3 visits: at the time of inclusion and at month 2 and 6 after starting treatment, during which laboratory, microbiological and radiological tests were performed and results recorded. Patients who needed to prolong therapy beyond 6 months, for whatever reason, were scheduled to return for another visit at month 9, and subsequently as judged appropriate until completion of treatment. Some patients attended more than 3 visits in the first 6 months for various reasons, including adverse reactions, delay in bacteriological conversion, suspected poor adherence, etc.

Variables

Independent Variables

Sociodemographic and anthropometric data were collected as well as smoking habit, concomitant diseases, diagnostic methods, treatment, drug susceptibility studies, treatment adherence, adverse drug reactions, side effects, need for hospital admission or sick leave.

Dependent Variables

Direct costs (hospitalization, visits, diagnostic tests, treatment) and indirect costs (derived from work absenteeism and loss of productivity, rehabilitation, and contact tracing) were estimated.