



## ENDOCRINOLOGÍA Y NUTRICIÓN

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## ORIGINAL ARTICLE

Healthcare costs of people with type 2 diabetes mellitus in the Basque Country (Spain)<sup>☆</sup>

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## KEYWORDS

Type 2 diabetes mellitus;  
Healthcare costs;  
Chronic disease;  
Multimorbidity

## Abstract

**Objective:** The aim of the study was to estimate the direct costs of healthcare provided to patients with type 2 diabetes mellitus (T2DM) in the Basque Country and to compare them with those of the population with chronic diseases.

**Material and methods:** A retrospective, cross-sectional, population-based study. Direct healthcare costs for patients aged over 35 years diagnosed with T2DM in the Basque Country (n = 126,894) were calculated, stratified by age, sex and deprivation index, and compared to the costs for the population diagnosed with a chronic disease other than T2DM (n = 1,347,043).

**Results:** The annual average healthcare cost of a person with T2DM was €3432. Cost gradually increased with age to €4313 in patients aged 80–84 years. Cost in males were €161 higher as compared to costs in females ( $P < 0.001$ ). In the most socioeconomically disadvantaged areas, cost per patient was €468 (14.9%) greater than in the most privileged areas ( $P < 0.001$ ). Moreover, cost was 68.5% higher ( $P < 0.001$ ) for patients with T2DM than for patients with other chronic diseases. Total annual direct costs amounted to €435.5 million, or 12.78% of total public health expenditure in the region.

**Conclusions:** Direct mean healthcare costs in the Basque Country for patients with T2DM were higher in males, in the most underprivileged areas, in patients with comorbidities, and in older age groups, and represented €3432 per person per year.

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**PALABRAS CLAVE**

Diabetes mellitus tipo 2;  
Costes sanitarios;  
Enfermedad crónica;  
Multimorbilidad

**Costes sanitarios de la población con diabetes mellitus tipo 2 en el País Vasco (España)****Resumen**

**Objetivos:** El propósito del estudio fue estimar los costes directos de la atención sanitaria prestada a pacientes con diabetes mellitus tipo 2 (DMT2) en el País Vasco y compararlos con aquellos de la población general con enfermedades crónicas.

**Material y métodos:** Para este estudio transversal, calculamos los costes directos de la atención sanitaria para personas mayores de 35 años con diagnóstico de DMT2 residentes en el País Vasco ( $n = 126.894$ ) por edad, sexo e índice de privación, y los comparamos con los costes de la población con diagnóstico de una enfermedad crónica distinta a la DMT2 ( $n = 1.347.043$ ).

**Resultados:** Los costes sanitarios anuales de una persona con DMT2 ascendieron a 3.432 €. Los costes se incrementaron progresivamente con la edad, hasta 4.313 € para personas entre 80 y 84 años. El gasto en hombres fue 161 € mayor que en mujeres ( $p < 0,001$ ). En las áreas más socioeconómicamente desfavorecidas, el coste por paciente fue 468 € (14,9%) mayor que en el segmento más favorecido ( $p < 0,001$ ). Además, los costes fueron un 68,5% mayores ( $p < 0,001$ ) para personas con DMT2 que para otros pacientes con enfermedades crónicas. Los costes directos anuales totales ascendieron a 435,5 millones de euros, lo que constituye un 12,78% del gasto total en sanidad de la región.

**Conclusiones:** En el País Vasco, el coste directo medio de la atención sanitaria a personas con DMT2 es de 3.432 €. Este coste es mayor en hombres, en las zonas más desfavorecidas, en grupos de edad más avanzada y crece según el número de comorbilidades.

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**Introduction**

Type 2 diabetes mellitus (T2DM) is a chronic disease highly prevalent in Spain<sup>1</sup> that has negative effects on health and quality of life of people. T2DM also represents a financial burden for society because of its high costs, both direct-related to treatments-and indirect-in terms of productivity losses.<sup>2</sup> Patients with T2DM often experience chronic complications associated to the disease, both microvascular and macrovascular, as well as greater chronic multimorbidity.

In Spain, various studies and a systematic review have recently estimated healthcare costs incurred by the population with diabetes,<sup>2-6</sup> updating the findings of the classical studies conducted in the first decade of the 21st century.<sup>7-10</sup> The purpose of these studies was to estimate the costs associated to diabetes (considering T2DM costs only in some cases, and costs of both type 1 diabetes mellitus and T2DM in other studies), identifying the resources associated to provision of care for diabetes and its complications. All studies considered the direct costs associated to diabetes mellitus, while some of them also estimated indirect costs.

There is agreement in that calculation of healthcare costs associated to T2DM should take into account all episodes related to the disease, as well as use of the resources needed for prevention and treatment of complications. On the other hand, there is an increasing emphasis on the burden of morbidity in people with diabetes due to diseases other than T2DM or their associated complications.<sup>11</sup> In this regard, Struijs et al.,<sup>12</sup> among other authors, have shown that comorbidities not related to diabetes have an effect, in terms of healthcare costs, similar to or greater than that of comorbidities related to diabetes.

Because of the foregoing, we will focus on the direct healthcare costs associated to provision of care to patients with T2DM. As the annual healthcare costs incurred by patients with T2DM and no comorbidities had been estimated to be €721 greater<sup>13</sup> than the costs for a healthy person in the Basque Country, it was decided to compare the costs of the population with T2DM and those of the population with chronic diseases in a context of high prevalence of chronicity.

To summarize, the objective of this study was to estimate the direct healthcare costs associated to provision of care to patients with T2DM in the Basque Country and to compare them to those of the overall population of chronically ill patients.

**Patients and methods**

The study was approved by the research ethics committee of the Basque Country (PI2014074). Informed consent was not requested because the clinical histories of patients were anonymized before they were used for this analysis.

This cross-sectional study focused on the period from September 1, 2010 to August 31, 2011 to calculate the direct healthcare costs of all people over 35 years of age with diagnosis of T2DM in the Basque Country ( $n = 126,894$ ). For this, data were retrospectively collected using the PREST database.<sup>14</sup>

The Basque health system is a universal system based on taxes that virtually covers 100% of the population. In fact, the total population included in the PREST database was 2,262,707 (the official population is 2,191,000, but health services are also provided to irregular migrants and other population not appearing in the official census). The study

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