



Admissions for imported and non-imported parasitic diseases at a General Hospital in Spain: A retrospective analysis

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Summary *Objective:* To analyze imported and non-imported parasitic diseases as a cause of admission to a general hospital.

Methods: A retrospective analysis of hospital admissions for parasitic diseases between 2004 and 2013 performed by means of hospital information systems at a public hospital in the city of Castellón (Spain).

Results: During the period covered in this study, there were 204,349 admissions, 213 of which were for parasitic diseases (prevalence: 1.04/1000 admission). 129 were neglected parasitic tropical diseases and 61 were imported parasitic diseases. The main parasitic diseases were hydatidosis (24.9%), visceral leishmaniasis (22.5%) and malaria (12.2%). There was a decrease in admissions for visceral leishmaniasis in the 2004–2008 period from 27.7% to 15.9% in the 2009–2013 period ($p < 0.001$), and an increase in admissions for malaria from 5.0% to 21.3% ($p < 0.001$). 38 (20.3%) of the 187 patients with parasitic diseases were HIV infected. HIV infection was more common in patients with toxoplasmosis (94.1%; $p < 0.001$), cryptosporidiosis (66.7%; $p < 0.02$) and visceral leishmaniasis (46.4%; $p = 0.003$). There were 34 (18.2%) children with parasitic diseases. Twelve of the 28 patients with visceral leishmaniasis (42.9%; $p < 0.001$), and 11 of the 17 patients with soil-transmitted diseases were children (64.7%; $p < 0.001$). The cause of death in eight patients was parasitic disease related (mortality rate: 4.3%). The mortality rate for visceral leishmaniasis was significantly higher (14.3%; $p = 0.01$).

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Conclusion: The main cause is endemic parasitic diseases such as hydatidosis. Visceral leishmaniasis decreased during the period covered by the study, but malaria increased.

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Parasitic diseases are an important cause of morbidity and mortality in the human population, and are the most common infectious disease in the world [1]. They affect more than half the world's population, especially in resource constrained countries where in addition to a low income there are poor hygienic conditions and a lack of adequate structures for proper health care. Parasitic diseases that cause high morbidity and mortality also have indirect consequences for populations since they affect the physical and mental development of people, who become part of the problem itself. This subsequently slows down the development of these countries [1].

Eleven parasitic diseases are considered as *neglected tropical diseases* (NTDs) by the WHO. The NTDs are a group of mainly chronic illnesses identified as causing considerable morbidity and mortality, typically amongst the world's poorest populations, and they are also shown to increase poverty [2].

Migration to the European Union has increased potentially during the last 2 decades. However, immigration to Spain is a relatively recent phenomenon, which according to the Spanish Statistical Office has increased dramatically; from 2.9% in 1998 to 10.9% in 2012, with approximately 75% of immigrants coming from medium and low-income countries [3]. Besides this, the appearance of imported diseases, especially parasitic diseases, is also due to travel to low-income countries, and Spain may be an example of how this has had an impact on certain parasitic diseases [4].

The current growth in international travel and immigration is a well-known phenomenon and NTDs are no longer geographically restricted, since both immigrants and travelers, including immigrants who travel to visit friends and relatives (VFRs) in the western world, may appear with these infections [4,5].

Spain is a country where there are several autochthonous endemic parasitic diseases; leishmaniasis, toxoplasmosis, hydatidosis or several helminthic diseases [6,7], but these diseases are not common in admissions to hospital [6,7]. This article focuses on admissions for parasitic and ectoparasitic diseases as well as parasitic NTDs at a General Hospital in a European country on the Mediterranean coast. To date, there has been no significant focus in literature on imported and non-imported parasitic diseases as a cause of admission to a general hospital.

1. Material and methods

1.1. Design and setting

A retrospective analysis with hospital information systems from the Hospital Universitari General de Castelló (HUGC) in the city of Castellón (Spain) was performed. In January 2013, HUGC, which has 573 beds, provided healthcare to a

total census population of 316,364 inhabitants in the city of Castellón and its surroundings. Although it does not have a specific Tropical or Travel Medicine unit for treating inpatients and outpatients, it does have an Infectious Diseases Unit that attends patients with tropical illnesses. Information about hospital discharges was obtained from the hospital information systems from 2004 to 2013. The diagnoses at discharge were performed according to the International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) main groups of diagnoses.

We have considered recurrent admission for parasitic disease when the same national health identification number registers admission for the same disease.

In 2001, Castellon had 10,020 foreign citizens, representing 6.5% of its inhabitants, which increased to 32,321 in 2010 (21.5%). Most foreign people came from Europe (71.1%), especially Rumania (84%), 14% from Central and South America and 11.5% from Africa [8].

1.2. Variables

It is important to note that this study exclusively addresses the area of hospital admissions. Hospital admissions for parasitic diseases (echinococcosis, schistosomiasis, anisakiasis; soil-transmitted helminthiasis, toxoplasmosis, giardiasis, malaria, cryptosporidiosis, isosporiasis, amoebiasis, leishmaniasis, cysticercosis, trypanosomiasis, trichomoniasis, filariasis, myiasis, and scabies) were obtained following the ICD-9-CM codes: from 006 to 007.9, from 084 to 86.9 and from 120.0 to 134.9. We only analyzed the records reporting one of the predefined parasitic diseases as either the main or first diagnosis at admission, as well as those which were a secondary diagnosis. The following data were collected for each admission: demographic characteristics, nationality, diagnosis at discharge, outcome and human immunodeficiency virus (HIV) status. We considered imported parasitic diseases: 1) the non-endemic parasitic diseases in Spain (malaria, cysticercosis, schistosomiasis, isosporiasis, filariasis, trypanosomiasis) and 2) Spanish parasitic endemic diseases but present in immigrant patients (such as hydatidosis, visceral leishmaniasis, giardiasis, toxoplasmosis, soil-transmitted helminthiasis, scabies, amoebiasis, trichomoniasis, cryptosporidiosis, anisakiasis, myiasis). We made two levels of analysis: the burden of parasitic diseases calculated on admission, and case descriptions of the most significant parasitic diseases. The hospital information systems did not register length of time of immigrants' residence in Spain.

1.3. Statistical analysis

Statistical analysis was performed with SPSS 21.0 (IBM, Chicago, Ill, USA) and values of $p < 0.05$ were considered

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