

## Background

Alzheimer's disease (AD) is the most common form of dementia, accounting for 60-80% of dementia cases [1]. In 2016, AD was the ninth cause of death in Spain, responsible for 36,027 deaths; 70% of the deaths were in women [2].

Primary care plays a central role in the diagnosis of dementia and its possible association with AD, while diagnosing AD generally requires an evaluation conducted by neurologists [3,4].

The increasing number of clinical trials investigating new treatments and earlier diagnostic methods has justified a new for updated AD epidemiology data [5].

**Objectives:** To analyze the hospital incidence and mortality of AD in Spain and to evaluate patients' use of healthcare resources and direct medical costs.

## Methods

- Hospital admission records between 2011 and 2016 were selected from a Spanish hospital discharge database, identified using ICD-9 and ICD-10 codes.
- Hospital incidence was defined as the annual rate of AD related admissions by the total number of hospital admissions.
- In-hospital mortality was calculated as the annual number of hospital deaths registered in patients with AD by the total number of patients admitted with AD.
- Direct medical costs of specialized healthcare were extracted from the database, and included all expenses related to the admission.

## References

- [1] Wilson et al. *Psychol Aging*. 2012; 27(4):1008-17. [2] Soriano et al. *Med Clin (Barc)*. 2018; 151(5):171-190. [3] Moga et al. *Prim Care*. 2017; 44(3):439-456. [4] McKhann et al. *Alzheimers Dement*. 2011; 7(3):263-9. [5] Briggs et al. *Clin Med (Lond)*. 2016; 16(3):247-53.

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## Results

### Patient characteristics

Admission files from 7,894 patients were obtained; 61.9% of the patients were females, and mean age was 80.4 years. Mean in-hospital mortality rate was 9.5%.

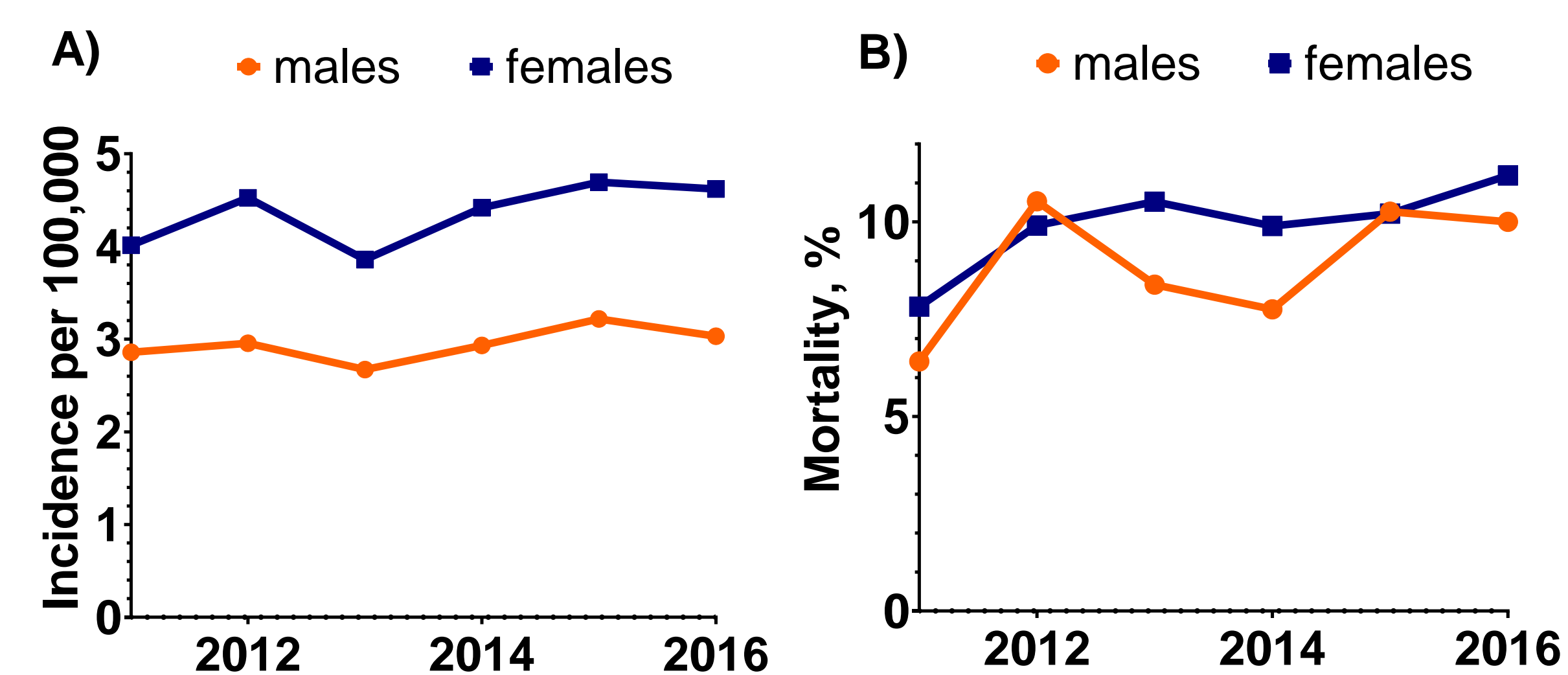
The most frequent comorbidities are listed in Table 1.

**Table 1. Secondary diagnoses registered in >10% of admissions.**

Secondary diagnoses, %	Total admissions	Deceased patients
Essential hypertension	42.7	28.1
Disorder of lipid metabolism	25.0	12.7
Diabetes mellitus	23.7	17.0
Cardiac dysrhythmias	13.9	15.5
Urinary tract infection	13.2	10.2
Osteoarthritis and allied disorders	11.5	6.9
Dementia	10.5	6.8
Unspecified cerebrovascular disease	10.3	4.1

### Incidence and mortality

Hospital incidence of AD was 3.7 per 10,000 patients between 2011 and 2016, increasing over the study period (Figure 1A).



**Figure 1. A) Hospital incidence and B) in-hospital mortality rate of AD in Spain (2011-2016).**

In-hospital mortality rate was 9.5% over the study period, increasing over time (Figure 1B).

Mortality was mainly associated to respiratory conditions.

### Use of healthcare resources

Most admissions were urgent and inpatient admissions. Mean length of stay was 10.5 days (Table 2).

**Table 2. Admission details.**

	Total admissions
Urgent admissions, %	81.8
Mean length of hospital stay, days	10.5
Admissions into internal medicine services	46.2
Admissions into neurology services	19.1
Admissions into geriatrics	10.8
Admissions into psychiatric services	10.6
Readmission rate, %	10.0

Diagnostic imaging techniques were predominant for these patients, whereas psychiatric evaluation appeared underrepresented (Table 3).

**Table 3. Medical procedures registered during the admission.**

Medical procedures	Total admissions
Computerized axial tomography	30.6
Injection or infusion of a therapeutic or prophylactic substance	29.6
Skeletal x-ray	22.3
Electrocardiogram	13.6
Microscopic examination of blood	11.9

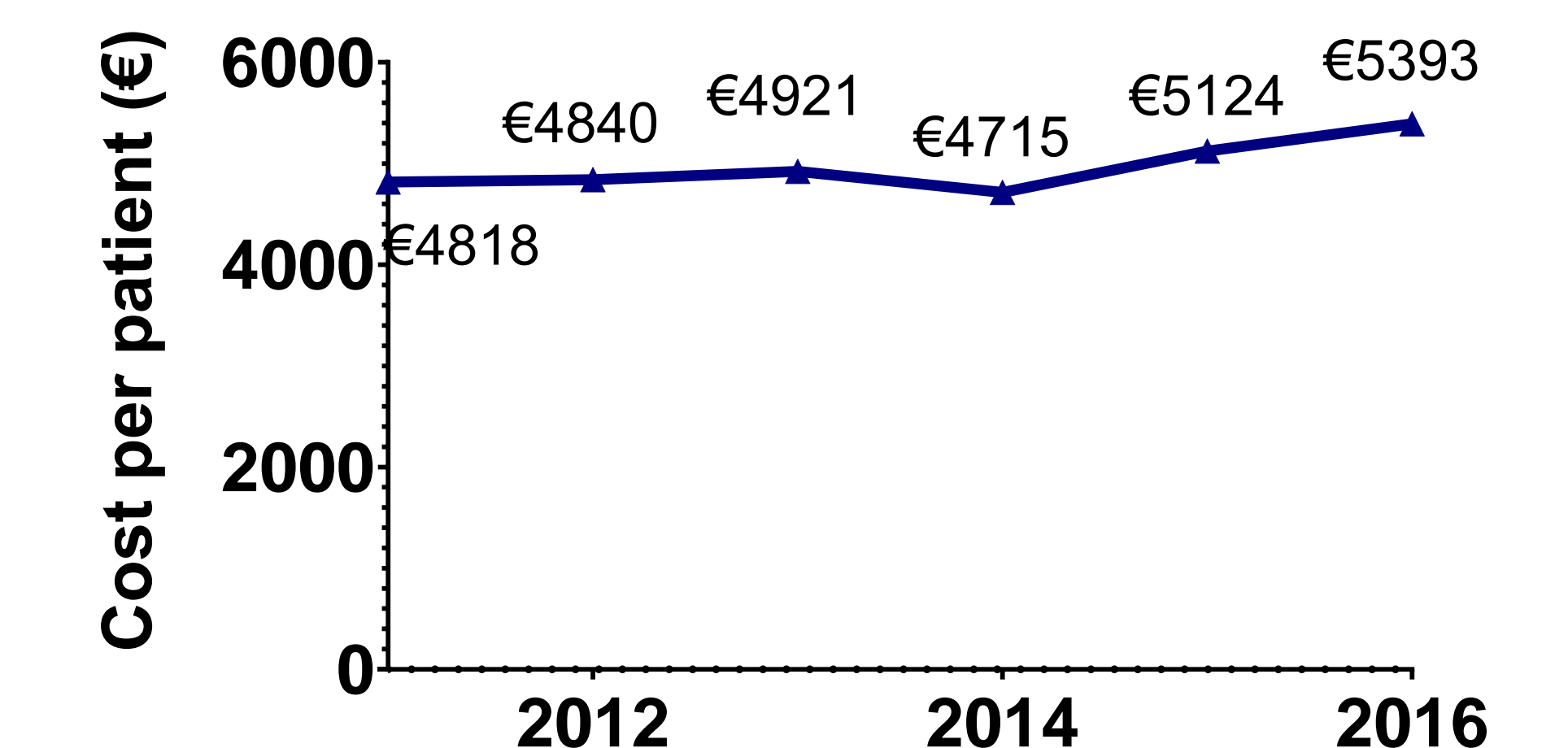
### Direct medical cost

The mean annual cost per patient €4969, with significant variations with length of stay (Table 4). Cost of deceased patients, likely to have reached advanced stages of AD, was €6022.

**Table 4. Mean direct medical costs per length of stay (LOS).**

	LOS ≤ 7 days	LOS > 7 days
Total patients	€ 4626	€ 5051
Deceased patients	€ 5880	€ 6197
Urgent admissions	€ 4653	€ 5057
Patients with non-invasive ventilation	€ 4911	€ 6271
Patients with invasive ventilation	€ 6651	€ 44,974
Patients with other oxygen enrichment	€ 6512	€ 7441

Mean annual cost per patient increased significantly over the study period ( $p < 0.001$ ) (Figure 2).



**Figure 2. Annual direct medical cost of hospital care per patient.**

## Conclusions

- Avoiding unnecessary admissions and shortening hospitalization time when patient condition cannot be improved could reduce the total medical cost of this disease.
- Alzheimer's increasing incidence is likely to translate in a growth of medical costs.
- Multidisciplinary care should be promoted, following early detection and optimized care, while new treatments are investigated.