Multimorbidity in patients with type 2 diabetes mellitus in the Basque Country (Spain)

Roberto Nuño-Solinís & Edurne Alonso-Morán
O+berri, Basque Institute for Healthcare Innovation

This presentation arises from the Joint Action addressing chronic diseases and healthy ageing across the life cycle (JA-CHRODIS) which has received funding from the European Union, under the framework of the Health Programme (2008-2013).
In Spain, the prevalence of diabetes mellitus type 2 (T2DM) in patients over 17 years is 13.8% and around 6% is unknown.

Between 2011 and 2013 the incidence of diabetes mellitus has increased in a 33.4%.

The average cost of a patient with diabetes is estimated in 2,449 € per year, nearly twice the per capita cost.
WHAT WE ALREADY KNOW: MM in the Basque Country

Multimorbidity of chronic diseases was found among **23.61%** of the total Basque population and among **66.13%** of those older than 65 years.

The average number of chronic conditions is **higher among women** and increases with the deprivation index.

Multimorbid patients account for **63.55%** of total healthcare expenditures.
The objectives of this study are:

- To describe the prevalence of multimorbidity of patients with T2DM
  - Related complications
  - Unrelated complications
- To estimate direct healthcare costs
METHODS (I)

• Descriptive study

• Study Subjects: Patients with type 2 diabetes mellitus from the Basque Country, aged ≥ 35 years

• Period 09/01/2010 to 31/08/2011

• Inclusion criteria: Everybody who had been diagnosed with type 2 diabetes mellitus or unspecified diabetes mellitus at any point in their lives, or who had been prescribed antidiabetic medication, regardless of whether or not they had visited healthcare services during the observation period.
METHODS (II)

• Exclusion criteria: Patients who had been diagnosed with type 1 diabetes mellitus during any contact with the services, or those whose diagnosis always corresponded to unspecified diabetes mellitus, but the only medication received was insulin.

• Databases:
  - PREST database (sociodemographics, comorbidities classified by a case-mix diagnostic system [Adjusted Clinical Groups] and healthcare costs variables)
  - Multimorbidity database (52 chronic conditions codify as 0 if the disease is not present and as 1 if the disease is present)
# ESTIMATION OF HEALTHCARE COSTS

<table>
<thead>
<tr>
<th>Category</th>
<th>Items</th>
</tr>
</thead>
</table>
| Primary care       | • Visits to GP
                    | • Visits to nurse
                    | • Radiology and Blood tests                                        |
| Especialized care  | • Visits to specialist doctor
                    | • Day hospital (some procedures like: dialysis, chemotherapy and others) |
| Inpatients         | • Diagnosis Related Groups (GRD)                                     |
| Emergency          | • Directly from the number of visits                                 |
| Prescriptions      | • Directly from prescriptions coded in the EHR in Primary Care       |
In the Basque Country, in the population with 35 years and over (1,473,943 inhabitants), 134,413 patients suffer from T2DM, corresponding to a known prevalence of 9.12%.

The prevalence of multimorbidity was 90.4% between patients with T2DM.
## RESULTS

### Related pathologies to T2DM

<table>
<thead>
<tr>
<th>Type 2 diabetes complications (prevalence)</th>
<th>Total (N=134,421)</th>
<th>Males (N=72,539)</th>
<th>Females (N=61,882)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ischaemic Heart Disease</td>
<td>11.45</td>
<td>14.54</td>
<td>7.83</td>
</tr>
<tr>
<td>Renal failure</td>
<td>8.37</td>
<td>8.35</td>
<td>8.4</td>
</tr>
<tr>
<td>Stroke</td>
<td>6.96</td>
<td>7.42</td>
<td>6.42</td>
</tr>
<tr>
<td>Heart Failure</td>
<td>4.32</td>
<td>3.93</td>
<td>4.79</td>
</tr>
<tr>
<td>Peripheral neuropathy</td>
<td>1.33</td>
<td>1.24</td>
<td>1.44</td>
</tr>
<tr>
<td>Foot Ulcers</td>
<td>1.93</td>
<td>1.76</td>
<td>2.13</td>
</tr>
<tr>
<td>Retinopathy</td>
<td>7.18</td>
<td>7.18</td>
<td>7.18</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type 2 diabetes complications (incidence)</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Myocardial infarction</td>
<td>0.4</td>
<td>0.5</td>
<td>0.29</td>
</tr>
<tr>
<td>Major amputations</td>
<td>0.08</td>
<td>0.09</td>
<td>0.06</td>
</tr>
<tr>
<td>Avoidable hospitalisations</td>
<td>5.5</td>
<td>5.81</td>
<td>5.14</td>
</tr>
</tbody>
</table>
### RESULTS

**Unrelated pathologies to T2DM**

<table>
<thead>
<tr>
<th>Chronic disease</th>
<th>Overall (%)</th>
<th>Males (%)</th>
<th>Females (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypertension</td>
<td>73.71</td>
<td>73.23</td>
<td>73.54</td>
</tr>
<tr>
<td>Dyspepsia</td>
<td>13.81</td>
<td>11.36</td>
<td>16.70</td>
</tr>
<tr>
<td>Prostatic hypertrophy</td>
<td>—</td>
<td>13.48</td>
<td>—</td>
</tr>
<tr>
<td>Anxiety</td>
<td>12.75</td>
<td>8.54</td>
<td>18.10</td>
</tr>
<tr>
<td>Degenerative joint disease</td>
<td>11.72</td>
<td>7.79</td>
<td>15.79</td>
</tr>
<tr>
<td>Atrial Fibrillation</td>
<td>10.40</td>
<td>12.15</td>
<td>8.54</td>
</tr>
<tr>
<td>Depression</td>
<td>9.77</td>
<td>5.47</td>
<td>14.78</td>
</tr>
<tr>
<td>Malignant neoplasms</td>
<td>8.86</td>
<td>11.17</td>
<td>6.96</td>
</tr>
<tr>
<td>Chronic heart disease, other</td>
<td>8.57</td>
<td>10.77</td>
<td>6.09</td>
</tr>
<tr>
<td>Emphysema, chronic bronchitis, COPD</td>
<td>8.23</td>
<td>12.09</td>
<td>4.50</td>
</tr>
<tr>
<td>Hypothyroidism</td>
<td>6.22</td>
<td>2.31</td>
<td>11.31</td>
</tr>
<tr>
<td>Low back pain</td>
<td>5.82</td>
<td>4.34</td>
<td>7.65</td>
</tr>
<tr>
<td>Dementia</td>
<td>5.05</td>
<td>4.17</td>
<td>5.80</td>
</tr>
</tbody>
</table>
RESULTS

Costs increase with age until the range of 80-84, where reach a maximum of 4,313€

Patients living in more deprived areas spend 468€ more than those more affluent.
RESULTS (T2DM population vs. chronic population without T2DM)

In all age ranges, healthcare costs in patients with T2DM is higher than that for chronic patients without this condition.

On average, a chronic patient without T2DM spent 2037€, nearly 69% less than a patient with T2DM.

The differences between these two populations were statistically significant for all age ranges.
CLUSTER ANALYSIS (I)

Wards-linkage clustering
With the cut point at 0.9, we got 10 clusters:

**Hypertension**  
Ischemic Heart Disease  
Atrial fibrillation  
Chronic heart disease, others  
Renal Failure  
Heart Failure

**Glaucoma**  
Blindness & low vision

**Dementia**  
Cerebro-vascular disease

**Anxiety**  
Depression

**Degenerative joint disease**  
Low back pain.  
Osteoporosis  
Hypotiroidism  
Peripheral neuropathy, neuritis

**Deafness, hearing loss**

**Malignancies**  
Prostatic hypertrophy  
Gout

**Chronic liver or pancreatic disease**  
Chromosomal anomalies or Inherited metabolic disorders

**Emphysema, chronic bronchitis, COPD**  
Asthma

**Treated dyspepsia**  
Rheumatoid arthritis and autoimmune and connective tissue diseases  
Diverticular disease of intestine
CONCLUSIONS (I)

General population

• MULTIMORBIDITY IS THE NORM: multimorbidity was found in 66.13% of the population aged 65 and over, and increases with age until 85 years.
• MULTIMORBIDITY IS LINKED TO INEQUALITIES: the prevalence of multimorbidity was higher in deprived (69.94%) than better-off (60.22%) areas.
• TACKLING MULTIMORBIDITY IS EXPENSIVE: multimorbid patients account for 63.55% of total healthcare expenditures.
CONCLUSIONS (II)

T2DM population

• WE NEED HOLISTIC PERSON-CENTERED CARE MODELS: the prevalence of multimorbidity was 90.4% between patients with T2DM.
• DIABETES IS A PARADIGMATIC AND EXPENSIVE CHRONIC DISEASE: a person with T2DM spends 68.5% more than a chronic patient without T2DM.
• WE MUST TACKLE INEQUALITIES: in the most disadvantaged socioeconomic strata cost per patient is 468€ (14.9%) more than in the most affluent segment.
• THE IMPACT OF DIRECT HEALTHCARE COSTS FOR T2DM PATIENTS IS HUGE: the total annual direct cost amounted to 435.5 million Euros, 12.78% of the public health expenditure in the Basque Country.
The Joint Action on Chronic Diseases and promoting healthy ageing across the life cycle (JA-CHRODIS)*

* THIS PRESENTATION ARISES FROM THE JOINT ACTION ON CHRONIC DISEASES AND PROMOTING HEALTHY AGEING ACROSS THE LIFE CYCLE (JA-CHRODIS) WHICH HAS RECEIVED FUNDING FROM THE EUROPEAN UNION, IN THE FRAMEWORK OF THE HEALTH PROGRAMME (2008-2013)