Objectives

- Lung cancer is the leading cause of cancer death accounting for 1.3 million deaths each year in the world. 1
- Lung cancer was the first cause of cancer death in Portugal with 3,514 deaths in 2012. 2
- Non-Small Cell Lung Cancer (NSCLC) is the most common type of lung cancer, representing 80 to 85% of all cases. 3
- This study estimates the costs of illness and the burden of disease attributable to NSCLC in Portugal in 2012.

Methods

Burden of Disease

- Disability Adjusted Life-years (DALY) is the unit measure of disease burden. This indicator combines the years of potential life lost due to premature mortality (YLL) and the years of healthy life lost due to disability (YLD). 4
- The YLL correspond to the number of deaths multiplied by the socially weighted and discounted life expectancy of the age at which death occur using a standardized life table. 5
- Lung cancer deaths by age and gender were estimated based on the European Detailed Mortality Database from WHO. 6 The proportion of NSCLC deaths among the total of lung cancer deaths was estimated applying a ratio of 85.7%, estimated from the Diagnosis-Related Groups (DRG) Portuguese database for 2012. 7
- In order to estimate YLD in a particular period of time, the number of incident cases in that period is multiplied by the average duration of the disease. The duration is weighted by an indicator reflecting the severity of the disease on a scale ranging from 0 (perfect health) to 1 (death). 8
- NSCLC incidence in 2012 was estimated based on trends in the Portuguese National Cancer Registry 2006 and Regional Cancer Registries 2006 to 2009. 9
- The average duration of the disease was derived from the survival curves published by the International Association for the Study of Lung Cancer. 10
- Disability weights were taken from the Netherlands Study, available separately for stages of the disease. 11

Cost of illness

- Cost of illness was estimated based on NSCLC prevalence in 2012.
- Data from 1) a cohort of SEL Portugal patients with NSCLC, 2) on past incidence rates and 3) from an expert panel were used to develop a model predicting the distribution and transitions of patients across stages throughout 2012.
- To simplify the staging of disease patients were distributed in 2 main stages: loco-regional stage (I-IIa) and advanced stage (IIB-IV) (Figure 1).

Follow-up

- The incidence distribution of patients by stage was estimated based on the aforementioned model of SEL patients. Most patients (70%) were diagnosed in advanced stages (IIB-IV).
- Death probabilities were derived from the survival curves published by International Association for the Study of Lung Cancer (IALC). Five year survival was 28.5% for patients in loco-regional stages and 8.1% for patients in advanced stages. 12
- Recurrence probabilities were derived from the literature. 5-year local recurrence was 9% and distant recurrence was 27%. 13
- The economic impact analysis included two components: the direct costs generated by NSCLC including consumption of inpatient and outpatient care (vits, medication, diagnostic exams, transportation, etc) and the indirect costs related to loss of productivity due to NSCLC.
- Inpatient costs were estimated using the Portuguese DRG 2012 database. Patients with hospitalisation episodes were identified using the 9th International Classification of Diseases.
- Outpatient costs were estimated based on outpatient information from the Portuguese DRG database and the expert panel.
- Unit costs were taken from Portuguese legislation and drug costs from the Catalogue for Public Health Procurement and Informed database.
- Indirect costs related to loss of productivity were estimated using the Human Capital approach and a Labor Ministry database with compensation information. 22

Cost and Burden of Non-Small Cell Lung Cancer in Portugal

- A total of 3,180 deaths in 2012 were caused by NSCLC. Male deaths account for 78% of all NSCLC deaths. In 2012 NSCLC mortality accounted for 3.05% of total mortality in Portugal.
- The estimated YLL added up to 20,751, representing 4.7% of the total years of life lost for all deaths in Portugal.

Items Lost due to Disability (YLD)

- In 2012 an incidence of 3,513 new cases was estimated for NSCLC in Portugal.
- The estimated mean duration of the disease for patients diagnosed in a loco-regional stage (I-IIa) was 2.8 years, while it was 1.2 years for patients diagnosed in an advanced stage (IIB-IV).
- The mean disability weight for the loco-regional stages was 0.499 and for the advanced stages was 0.889.
- The total estimate of YLD attributed to NSCLC in Portugal was 3,236.

Overall disease burden

- The global burden of NSCLC was estimated to be 28,307 DALY (Table 1).
- YLL represented 89% of the total of DALY, underlying the impact of this disease in terms of mortality.

Table 1. DALY attributable to NSCLC in Portugal in 2012.

<table>
<thead>
<tr>
<th></th>
<th>YLL</th>
<th>YLD</th>
<th>DALY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Men</td>
<td>19,556</td>
<td>2,560</td>
<td>22,116</td>
</tr>
<tr>
<td>Woman</td>
<td>5,515</td>
<td>675</td>
<td>6,190</td>
</tr>
<tr>
<td>Total</td>
<td>25,071</td>
<td>3,236</td>
<td>28,307</td>
</tr>
</tbody>
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Cost of illness

- The estimated direct cost attributable to NSCLC in 2014 prices is € 89 million, which can be broken down into € 12 million for inpatient care and € 5.7 million for outpatient care.
- The indirect costs due to disability add up to € 5.4 million from the loco-regional stages and € 50 million from advanced stages. These estimates include both long-term effects such as premature retirement and short run effects such as absenteeism.

Conclusions

- NSCLC is an important cause of disease burden, accountable for 28,307 DALY.
- The majority of NSCLC burden is due to mortality.
- The disease burden falls mostly on male patients.
- The overall costs of disease are estimated at € 145 million, about 0.2% of Portuguese GDP and 0.9% of the overall Portuguese 2012 health expenditure.
- The costs and burden of disease suggest that NSCLC has a salient impact on Portuguese health costs and society’s welfare. Consequently NSCLC should receive appropriate attention from policy makers.

Acknowledgements

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References