Evaluation of cost and length of stay's homogeneity per APR-DRG, for oncological inpatient stays in 11 Belgian hospitals

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Introduction
Some months ago, the Belgian Minister of Social Affairs and Public Health presented a road map to introduce a prospective lump sum funding system in hospitals, based on Diagnosis Related groups (DRG). In such a system, hospitals receive a fixed amount per case, depending on the disease of the patient. In countries that have adopted this mode of financing, an all-in system is never applied to 100%. Extra funding is applied to different types of activity such as long term care, mental health care, revalidation, teaching and research in academic hospitals, some expensive drugs and equipment, some innovative technologies, patients whose length of stay (LOS) or costs are deviating (outliers), etc. This differential funding is appropriate especially when the DRG classification is not indicative of the health state of the patient or when there is significant cost heterogeneity within the same DRG group.

Cancer care represent in Belgium approximately 3% of total health care expenditures. The magnitude of oncology expenditures and the growth of the expenditures, partially explained by the ageing of the population, lead to an increasing interest in this subject. The objectives of this study are: (1) analyze medical and economical characteristics of oncological patients from different hospitals and (2) assess the homogeneity of costs and LOS for inpatients in oncology-DRGs

Methods
Inpatient Cost data (hospital perspective, year 2012) are retrieved from 11 Belgian general hospitals. Inpatients with a primary diagnosis, relating to oncology (ICD-9-CM code 140-239) were selected (n= 6063). Hospital stays were classified according to All Patient Refined Diagnosis Related Groups (APR-DRG), version 15 (V15) and 28 (V28).

The coefficients of variation (CV) are calculated, for DRGs and SOI with more than 30 stays, in order to measure the homogeneity of costs and LOS per APR-DRG and per severity of illness. They were calculated after removal of cost outliers. High (HO) and low outliers (LO) have been estimated using the following rule: HO= P (percentile) 75 + 1.5 X IQR (interquartile range), LO= P25-1,5 X IQR

Results
52.23 % of inpatients are grouped into 3 DRG (136 RESPIRATORY MALIGNANCY, 363 BREAST PROCEDURES EXCEPT MASTECTOMY, 221 MAJOR SMALL & LARGE BOWEL PROCEDURES). 94.5% of patients have secondary diagnoses and 58.8 % have already been readmitted to hospital during the year. 49.3 % of patients are males, 94.7 % come from their home, 77.3% are sent by a specialist doctor from the hospital. The mortality rate is 10.4 %.

15.7% of patients had an intensive care unit stay. The average LOS (standard deviation) is 9.31 days (11.87) and the cost is €7 641.34 (€10 112.12). The outlier's rate is 4.4 % with V15 of APR-DRGs and 5.1% with V28. In V15, the highest LOS, for DRG and SOI with more than 30 patients, is observed for DRG 221 (MAJOR SMALL & LARGE BOWEL PROCEDURES), SOI 4, with 24.98 days. The highest cost is also observed for this DRG and SOI: 22.314,72 €, (n=44). In V28, the mean LOS is 18.57 days and the mean cost is 18 759.37€, for this DRG and SOI (n= 106). The CV for costs and LOS are higher with V28 of APR-DRGs than with V15, varying from 0.20 to 1.12 for LOS and from 0.14 to 0.94 for costs. On average with V28, cv are 0.62, which does not suggest a too large heterogeneity. Costs are more homogeneous than LOS and version 15 of DRGs leads to a better homogeneity (table 1).

The heterogeneity of some of DRG and some severities of illness is explained by differences of costs and
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**Conclusions**

The objectives of this study were to analyze medical and economical characteristics of oncological patients from different hospitals and to assess the homogeneity of costs and LOS of inpatient stays, per APR-DRG and per SOI.

The results of this study have highlighted a homogeneity of costs and LOS for most APR - DRG and SOI, suggesting that a prospective payment system per APR-DRG would be applicable for those patients. Surprisingly, the homogeneity of costs and LOS seems more important with V15 of DRG than with V28.

**Length of Stay**

**Cost**

<table>
<thead>
<tr>
<th></th>
<th>V15 (n=5 791)</th>
<th>V28 (n= 5 752)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mean</strong></td>
<td>0.59</td>
<td>0.62</td>
</tr>
<tr>
<td><strong>Median</strong></td>
<td>0.63</td>
<td>0.62</td>
</tr>
<tr>
<td><strong>Min</strong></td>
<td>0.2</td>
<td>0.2</td>
</tr>
<tr>
<td><strong>Max</strong></td>
<td>1</td>
<td>1.12</td>
</tr>
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