Cost Associated With Hematopoietic Stem Cell Transplantation (HSCT) – A Retrospective Claims Data Analysis in Germany

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Introduction

Hematopoietic stem cell transplantation (HSCT) is a treatment option in relapsed/refractory acute lymphoblastic leukemias (ALL), diffuse large B-cell lymphoma (DLBCL), and follicular lymphoma (FL)1 with curative intent1

- The goal of HSCT is to restore the patient's lymphohematopoietic system, achieved by replacing the malignant cell population and re-establishing normal blood cell production

- HSCT can be autologous (using the patient's own stem cells) or allogeneic (using stem cells from a matched donor)

- For pediatric and adult patients with ALL, autologous HSCT is often not feasible or recommended2 due to poor quality of available cells from bone marrow

- There are risks associated with HSCT despite potential medical benefit for patients with life-threatening diseases

- Risks include mortality and transplant-related complications, especially with allogeneic HSCT

- HSCT is also associated with substantial costs

- To the best of our knowledge, no data have been published on costs associated with HSCT treatment in patients with leukemia and lymphoma in Germany

Objective

To quantify costs associated with HSCT in patients with ALL, DLBCL, and FL from a German study population

Methods

Study Design

Observational retrospective cohort study based on administrative claims data of the InGef (Institut für angewandte Gesundheitsforschung Berlin, which is nationally representative of the health insured population in Germany

Data Sources

Claims database of approximately 6.7 million patients, comprising 10% of the German statutory health insured population between 2010 and 2015

- The database includes:
  - Demographic information (including date of death if applicable)
  - Ambulatory service and ambulatory dispensing information: including date of admission, discharge, diagnoses, and procedures

- Procedure: supply of reimbursed drugs by pharmacies (including the corresponding date of prescription); reimbursed remedies and aids; and any diagnosis on times of hospitalization

- To support claims, diagnoses (ICD10-GM) and procedure codes are provided together with costs

Study Population

The index was the quarter when HSCT was performed, as shown in the study design figure (Figure 1)

- Inclusion and exclusion criteria for cost analysis were as follows:
  - Treatment with HSCT (identified based on the following OPS codes: 54,11–1, 54,11–2, 54,13–1, 54,14–1, 54,15–1, 80,51–1, 80,52–1, 80,55–1) between January 1, 2010, and June 30, 2014

- Continuous enrolment (or readmission) during 4 to 8 quarters after the HSCT index quarter (post-index period)

- An ambulatory verified or a primary or secondary hospital diagnosis of ALL (ICD-10-GM C91.1, DLBCL (ICD-10-GM C83.3), or FL (ICD-10-GM C14) in the same hospital case as the HSCT

- No inpatient diagnosis (or readmission) after the HSCT index quarter (post-index period) that is, after 1 year prior to the index quarter

- As a reference, costs were also analyzed in age- and sex-matched controls who were diagnosed with ALL, DLBCL, or FL received chemotherapy, and had no HSCT

Figure 1. Example Individual in each index period

Conclusions

- Costs associated with HSCT are substantial for patients with ALL, DLBCL, and FL in Germany

- Direct healthcare costs (including hospital, medication, ambulatory, remedy, and technical aid costs) are two to four times higher in patients who were diagnosed with ALL, DLBCL, or FL and had HSCT compared with those who did not have HSCT

- Indirect costs were estimated based on sick leave days and productivity loss

- Novel and curative therapies that allow patients to avoid HSCT could potentially reduce patient burden and total health care costs

References

1. Tsvetkov T and Andik Huay M. Autocell Cancer Cell Transplantation therapy. 2017;137(167-168)
2. Eppert N and Hambrecht M. Hematopoietic Oel Cell Transplant Therapy, 2017;1725-1726

Acknowledgments

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Table 1. Total Direct Health Care Costs Per Patient in € With HSCT in Selected Observation Periods vs Controls with Chemotherapy

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean</th>
<th>SD</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALL (autologous)</td>
<td>29,451</td>
<td>20,361</td>
<td>2,959</td>
<td>128,961</td>
</tr>
<tr>
<td>ALL (allogeneic)</td>
<td>20,728</td>
<td>18,452</td>
<td>2,257</td>
<td>107,765</td>
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<tr>
<td>ALL Pediatric</td>
<td>16,970</td>
<td>15,671</td>
<td>1,257</td>
<td>69,079</td>
</tr>
<tr>
<td>DLBCL (autologous)</td>
<td>230,386</td>
<td>156,390</td>
<td>7,370</td>
<td>1,022,340</td>
</tr>
<tr>
<td>DLBCL (allogeneic)</td>
<td>12,257</td>
<td>6,198</td>
<td>1,100</td>
<td>35,100</td>
</tr>
<tr>
<td>FL (autologous)</td>
<td>124,418</td>
<td>87,874</td>
<td>5,391</td>
<td>345,812</td>
</tr>
</tbody>
</table>

Notes on Table 1:

- Data are from the period 2 quarters before index quarter for all patients and 8 quarters after HSCT for patients with ALL, DLBCL, and FL

Table 2. Total Direct Health Care Costs Per Patient in € With HSCT vs Controls with Chemotherapy

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean</th>
<th>SD</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALL (autologous)</td>
<td>20,167</td>
<td>17,067</td>
<td>2,959</td>
<td>128,961</td>
</tr>
<tr>
<td>ALL (allogeneic)</td>
<td>12,257</td>
<td>6,198</td>
<td>1,100</td>
<td>35,100</td>
</tr>
<tr>
<td>ALL Pediatric</td>
<td>13,350</td>
<td>10,228</td>
<td>1,257</td>
<td>69,079</td>
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<tr>
<td>DLBCL (autologous)</td>
<td>183,886</td>
<td>122,150</td>
<td>7,370</td>
<td>975,910</td>
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<tr>
<td>DLBCL (allogeneic)</td>
<td>12,257</td>
<td>6,198</td>
<td>1,100</td>
<td>35,100</td>
</tr>
<tr>
<td>FL (autologous)</td>
<td>124,418</td>
<td>87,874</td>
<td>5,391</td>
<td>345,812</td>
</tr>
</tbody>
</table>

Notes on Table 2:

- Data are from the period 2 quarters before index quarter for all patients and 8 quarters after HSCT for patients with ALL, DLBCL, and FL

Table 3. Total Direct Health Care Costs Per Patient in € With HSCT Per Sector

<table>
<thead>
<tr>
<th>Sector</th>
<th>Mean</th>
<th>SD</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospital</td>
<td>137,371</td>
<td>112,841</td>
<td>2,257</td>
<td>795,000</td>
</tr>
<tr>
<td>Ambulatory</td>
<td>69,079</td>
<td>58,233</td>
<td>2,257</td>
<td>230,386</td>
</tr>
<tr>
<td>Remedies</td>
<td>17,767</td>
<td>14,948</td>
<td>1,100</td>
<td>128,961</td>
</tr>
</tbody>
</table>

Notes on Table 3:

- Independent of the underlying diagnosis, most costs in HSCT patients are incurred from hospital treatment (70%–95%) followed by medication cost (7%–14%) and ambulatory cost at a lesser extent (2%–5%)

Table 4. Mean Indirect Costs Per Patient in € With HSCT Over Time vs Controls with Chemotherapy

<table>
<thead>
<tr>
<th>Time</th>
<th>Mean</th>
<th>SD</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before HSCT</td>
<td>32,430</td>
<td>25,736</td>
<td>1,625</td>
<td>122,056</td>
</tr>
<tr>
<td>After HSCT</td>
<td>137,371</td>
<td>112,841</td>
<td>2,257</td>
<td>795,000</td>
</tr>
</tbody>
</table>

Notes on Table 4:

- Mean direct health care costs in patients with HSCT rise in the 2 quarters before HSCT, building to a peak in the quarter of transplantation, before falling again

- In year 2 after HSCT, health care costs are €20,258 (DLBCL/FL; autologous) and are approximately €530 for ALL and FL

- The highest mean cost per patient in year 2 after HSCT is in patients with DLBCL/FL who receive autologous HSCT; these costs are higher than in year 1 after HSCT

- Pediatric ALL is associated with the highest cost in the quarter of HSCT (€333,585) and lowest cost in year 2 after HSCT (€11,949) compared with the other 3 subpopulations evaluated

Disclosures

This study was funded by Novartis Pharmaceuticals Corporation, Gar-Hanover, NJ, USA; T3, GT, and 22 are employees of Elsevier Health Analytics (EHA); 11, 12, 13, and 23 are employees of Elsevier Health Analytics (EHA); 4, 5, and 6 are employees of Elsevier Health Analytics (EHA). EHA received payment from Novartis for analyzing the study data. LK is an employee of this health risk institute.

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To view disclosed conflict of interest, please visit: http://novartis.medicalcongressposters.com/Default.aspx?doc=e4317

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