BACKGROUND & OBJECTIVES

• Diffuse large B-cell lymphoma (DLBCL) is the most common type of non-Hodgkin's lymphoma with an annual incidence of 8.4 per 100,000.
• Little is known about the medical costs associated DLBCL throughout the treatment pathway, and no long-term predictive models have been developed.
• Based on a UK population-based patient cohort, this study aimed to develop a model for DLBCL that would allow the predicted cost and life expectancy results to be expressed at an individual level.

METHODS

Overview

• Model type: a discrete event simulation model was developed to reflect the complexities of patient characteristics, treatment options and prognostic factors of DLBCL.
• Time horizon: 5-year and lifetime.
• Data source: A large UK population-based patient cohort, the Haematological Malignancy Research Network (HMRN, www.hmrn.org) [1]. All adult newly diagnosed with DLBCL in 2007 within HMRN were followed for five years from the date of diagnosis.
• Perspective: All the analyses were conducted from a NHS perspective.

Model structure (see Figure 1)

• Simulation model: information on patient’s age, performance status, treatment options and treatment response were modelled for 4880 patients (estimated number of newly diagnosed with DLBCL each year in the UK [1]). The simplified model can be accessed via http://www.yousimul8.com/watch.php?x=5452224ddc33

Model inputs

• Probabilities: derived from HMRN data
• Unit cost: derived from HMRN data using National Tariffs 2013/14 and Hospital Episode Statistics (HES)
• Time to event: estimated from HMRN data
• All cause mortality: based on UK life-table

Model outcomes, assumptions and analysis

• Incidence-based outcomes: expected medical costs and life expectancy of newly diagnosed DLBCL patients
• Prevalence-based outcome: Annual costs associated with treating existing and new DLBCL patients
• Discount: both costs and life expectancy were discounted at an annual rate of 3.5% in order to adjust the future values to the present time
• Sensitivity analysis: the probabilistic sensitivity analysis was conducted in order to assess the uncertainty

RESULTS

Validation

• Internal: the model captured over 97% of empirical estimated costs and survival in 5-year time horizon.
• External: cost results consistent with findings from the relevant literature [2,3].

Cost and clinical outcomes (see Table 1)

• Patients who received treatment with curative intent tended to incur higher costs and survive longer than those who were not treated. It’s worth noting that the cost differences beyond five years are minor due to the fact that DLBCL patients are considered cured after staying in remission over 5 years.

Table 1: Cost and clinical outcomes

<table>
<thead>
<tr>
<th>Group</th>
<th>Survived (days)</th>
<th>Costs (£)</th>
<th>Survival horizon</th>
<th>Costs (£)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treated</td>
<td>4880</td>
<td>5,409</td>
<td>18,191</td>
<td></td>
</tr>
<tr>
<td>Not treated</td>
<td>3881</td>
<td>4,429</td>
<td>21,816</td>
<td></td>
</tr>
</tbody>
</table>

1st line only

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Survival horizon</th>
<th>Costs (£)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treated</td>
<td>3338</td>
<td>1,418</td>
<td>18,112</td>
</tr>
</tbody>
</table>

1st line plus

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Survival horizon</th>
<th>Costs (£)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treated</td>
<td>352</td>
<td>42</td>
<td>3,603</td>
</tr>
</tbody>
</table>

Age effect (See Table 2)

• Patients under 70 years old had a better survival but incurred higher medical costs than those over 70 years.
• For treated patients, the difference in cost and survival between patients under and over 70 years old was small (under 5-year time horizon), suggesting that patients over 70 years responded as well as those who were younger.

Table 2: Cost and clinical outcomes by age group

<table>
<thead>
<tr>
<th>Group</th>
<th>Survived (days)</th>
<th>Costs (£)</th>
<th>Survived (days)</th>
<th>Costs (£)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>2339</td>
<td>23,450</td>
<td>2,780</td>
<td></td>
</tr>
<tr>
<td>Treated</td>
<td>2153</td>
<td>21,816</td>
<td>1,410</td>
<td></td>
</tr>
</tbody>
</table>

Prevalence-based cost (See Figure 2)

• After simulating patients continuously into the model for 10 years, the margin of total annual costs for treating the DLBCL population across the UK as a whole was estimated to be in the region of £95 - £98 million.

CONCLUSIONS

• A patient level simulation model for DLBCL using population-based data, rather than trial data, has been developed that demonstrates good capability for predicting costs and survival.
• The DLBCL model developed could be used not only for evaluating new diagnostic tools and treatments, but also for supporting healthcare decisions.

REFERENCES


Figure 1: Model structure

This project is partially funded by and developed in collaboration as part of a Joint Working agreement with Roche Products Limited.