Cost-analysis of insulin degludec in comparison with insulin glargine U100 in the treatment of Type 1 Diabetes Mellitus in the Brazilian Public Healthcare System

Objective
To evaluate direct costs of the use of insulin degludec (IDeg) in comparison with insulin glargine (IGlar) in the treatment of Type 1 Diabetes Mellitus patients in a basic-bolus regimen (T1DMaB) in the Brazilian public healthcare system.

Methods
A one-year short-term model was developed to evaluate clinical and economic outcomes associated with the treatment of T1DMaB. The model measures resource use of insulin, needles, and the frequency of hypoglycemic events. It also considers insulin doses and routine clinical appointments for patients in treatment with Degludec and IGlar. Insulin dosages are derived from a meta-analysis of randomized clinical trials showing that Degludec was associated with 12% overall reduction in use of insulin compared to IGlar in T1DMaB patients. Rates of hypoglycemia were also derived from meta-analyses of randomized trials.

Results
Annual treatment costs were BRL 380.80 for IDeg and BRL 35.00 for IGlar. Unit costs were derived from official pricing and procedure reimbursement lists from the public healthcare perspective (i.e., CMED, BPS and STGAP). Costs presented in BRL and USD are based on the official exchange rate 1 USD = 5.12 BRL.* Dose reduction in bolus insulin was included only in sensitivity analysis.

Table 1: Mean insulin doses of IDeg and IGlar in T1DMaB patients

<table>
<thead>
<tr>
<th>Drug</th>
<th>Basal insulin</th>
<th>Bolus insulin</th>
<th>Total insulin</th>
<th>SMBG</th>
<th>Hypoglycemic events</th>
<th>Hypoglycemic events (costs)</th>
<th>Sensitivity Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>IDeg</td>
<td>3.10 IU</td>
<td>0.87 IU</td>
<td>3.97 IU</td>
<td>20</td>
<td>0.05 IU</td>
<td>0.05 IU</td>
<td></td>
</tr>
<tr>
<td>IGlar</td>
<td>3.35 IU</td>
<td>1.07 IU</td>
<td>4.42 IU</td>
<td>30</td>
<td>0.10 IU</td>
<td>0.10 IU</td>
<td></td>
</tr>
</tbody>
</table>

Figure 1: Model Diagram. Cost

Figure 2: Overall Annual Costs, IDeg and IGlar, T1DM

Table 3: Overall Treatment Cost by Variable, IDeg and IGlar

<table>
<thead>
<tr>
<th>Treatment</th>
<th>IDeg (USD)</th>
<th>IGlar (USD)</th>
<th>Difference (USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basal insulin</td>
<td>113.20</td>
<td>113.44</td>
<td>0.24</td>
</tr>
<tr>
<td>Bolus insulin</td>
<td>22.30</td>
<td>23.70</td>
<td>1.40</td>
</tr>
<tr>
<td>Total insulin</td>
<td>135.50</td>
<td>137.14</td>
<td>1.64</td>
</tr>
</tbody>
</table>

Sensitivity Analysis

- Sensitivity analysis demonstrates that some variables have potential impact on the annual treatment costs (i.e. dose reduction in bolus insulin) compared to the base case scenario.
- No critical variance in the annual costs is identified which confirms robustness of parameters.

Figure 3: Deterministic Sensitivity Analysis Results

Conclusions

- Determination of IDeg in the Brazilian public healthcare system for T1DM patients is associated with potential cost savings when compared to IGlar.
- Sensitivity analysis indicates potential additional savings to the public healthcare system.
- Budget-holders can either save resources or attend more patients by migrating patients with IDeg to IGlar.

References