A Cost Effectiveness Analysis of Palbociclib and other Aromatase Inhibitors for Treatment of Advanced Breast Cancer

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OBJECTIVES
• Third-generation aromatase inhibitors are considered as first-line therapies for the treatment of advanced estrogen receptor (ER) positive, human epidermal growth factor receptor (HER) 2-negative breast cancer.
• Palbociclib has been recently granted accelerated approval by the US FDA for use in combination with letrozole to treat ER-positive, HER2-negative advanced breast cancer in postmenopausal women.
• The purpose of this study was to determine the cost-effectiveness (C/E) of the newly approved drug therapy and compare its cost-effectiveness with the established oral aromatase inhibitors (anastrozole and letrozole) that are prescribed for the same indication.

METHODS
• A Markov disease-state transition model was designed to compare the cost-effectiveness of the three treatment regimens – anastrozole, letrozole, and combination therapy of letrozole and palbociclib.
• The analysis was carried out from a third-party payer perspective. The disease state transition probabilities were obtained based on published clinical trials.
• Drug acquisition costs were computed based on average whole sale price in the US; health utilities and costs for chemotherapy and palliative care were obtained from literature.
• All costs were converted to 2014 US dollars.
• Future costs and outcomes were discounted at 5%.
• Multiple one-way sensitivity analyses were conducted by varying treatment costs, efficacy of each treatment and discount rate.
• TreeAge Pro 2015 was used for the model.

Markov Model outline -

RESULTS
• A Markov disease-state transition model was designed to compare the cost-effectiveness of the three treatment regimens – anastrozole, letrozole, and combination therapy of letrozole and palbociclib.

Table 1: Results of Markov Model

<table>
<thead>
<tr>
<th>Drug Regimen</th>
<th>Cost Incurred</th>
<th>Incremental Cost</th>
<th>Incremental Effectiveness</th>
<th>C/E value</th>
<th>Incremental C/E (ICER)</th>
<th>ICER compared to benchmark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anastrozole</td>
<td>19982.18</td>
<td>1.40</td>
<td></td>
<td>14226.94</td>
<td>Benchmark</td>
<td></td>
</tr>
<tr>
<td>Letrozole</td>
<td>21322.64</td>
<td>1340.46</td>
<td>1.47</td>
<td>14545.26</td>
<td>21824.34</td>
<td>Undominated</td>
</tr>
<tr>
<td>Palbociclib plus</td>
<td>203867.42</td>
<td>182544.78</td>
<td>1.82</td>
<td>111791.95</td>
<td>510356.50</td>
<td>Undominated</td>
</tr>
</tbody>
</table>

• As compared with Anastrozole, the incremental cost-effectiveness ratio (ICER) of Letrozole and Palbociclib-Letrozole therapy was $21,824.34/life-year-gained and $51,0356.50/life-year-gained respectively.
• Sensitivity analyses found Anastrozole to be less cost-effective than Letrozole at lower rates of disease progression.

CONCLUSION
• The newly-approved combination therapy of Letrozole and Palbociclib was least cost-effective among all drug treatments under consideration.
• The poor cost-effectiveness of the Palbociclib-Letrozole therapy can be attributed to the higher acquisition cost of Palbociclib.

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