Modeling the Cost-effectiveness of Rituximab Use Compared to Tumor Necrosis Factor Inhibitors (anti-TNF) Agents as a Second-line Therapy in Patients with Rheumatoid Arthritis (RA) in Quebec, Canada Using RHUMADATA® Registry Data.

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Background

- No guidelines are currently available for selecting a specific biologic agent and/or for switching from one agent to another. The order of use of biologic agents after failing a first and/or second line anti-TNF is still a question for debate.
- Based on an analysis of the data from a rheumatology registry in Montreal, Quebec, a recent study showed that rituximab demonstrated better 6-year retention rate than 3 anti-TNFs as a second line agent, in rheumatoid arthritis (RA) patients unsuccessfully treated with one or two prior anti-TNFs [1].

Objective

- To determine whether rituximab as a second line therapy is cost-effective in RA patients unsuccessfully treated with one or two anti-TNF compared to 3 anti-TNFs.

Table 1: Patient baseline characteristics

<table>
<thead>
<tr>
<th>Variable</th>
<th>RTX (n=35)</th>
<th>ADA (n=44)</th>
<th>ETA (n=38)</th>
<th>INF (n=12)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean age (years)</td>
<td>61</td>
<td>54</td>
<td>57</td>
<td>50</td>
</tr>
<tr>
<td>Female</td>
<td>25</td>
<td>32</td>
<td>32</td>
<td>8</td>
</tr>
<tr>
<td>Average Charlson comorbidity index</td>
<td>1.6</td>
<td>1.3</td>
<td>1.4</td>
<td>1.4</td>
</tr>
<tr>
<td>RA duration</td>
<td>13</td>
<td>10</td>
<td>12</td>
<td>9</td>
</tr>
<tr>
<td>HAQ</td>
<td>1.55</td>
<td>1.34</td>
<td>1.40</td>
<td>1.51</td>
</tr>
<tr>
<td>On DMARDs</td>
<td>20</td>
<td>25</td>
<td>30</td>
<td>11</td>
</tr>
<tr>
<td>On NSAIDs</td>
<td>10</td>
<td>13</td>
<td>18</td>
<td>6</td>
</tr>
<tr>
<td>On corticosteroids</td>
<td>10</td>
<td>20</td>
<td>20</td>
<td>8</td>
</tr>
<tr>
<td>Failed 2nd line therapy during follow-up time</td>
<td>7</td>
<td>22</td>
<td>20</td>
<td>7</td>
</tr>
</tbody>
</table>

Methods

- Patients: A cohort of RA patients, from the RHUMADATA® registry, who failed first-line therapy with an anti-TNF and were prescribed rituximab, adalimumab, etanercept, or infliximab as a second biologic agent between January 1, 2007 and December 31, 2013.

- Treatment strategies:
  1. Second-line therapy with rituximab.
  2. Second line therapy with adalimumab.
  3. Second line therapy with etanercept.
  4. Second line therapy with infliximab.

- Follow-up: 6 years of follow-up, 12 6 month-long cycles

- Outcomes: 1. RA-related costs – Biologic agents and visits to rheumatologists (i.e., Public health care system perspective). 2. Effectiveness - quality-adjusted life-years gained

Table 2: Cost-effectiveness model inputs and sources of data

- Mean quality of life at the start (SD) | 0.40 (0.23) | 0.34 (0.24) | 0.24 (0.22) | 0.22 (0.22)
- Average half-QALYs gained during 1st cycle | 0.38 (0.10) | 0.40 (0.12) | 0.37 (0.12) | 0.37 (0.10)
- Average half-QALYs gained during next cycles | 0.46 (0.10) | 0.45 (0.17) | 0.47 (0.16) | 0.47 (0.16)
- Mean cost of biologic agents per cycle | $6,932 | $7,660 | $7,680 | $8,909
- Mean cost of visits to rheumatologists per cycle | $360 | $301 | $301 | $301
- Transition probabilities
  - Probability of failing the 2nd biologic agent (Figure 1) Not applicable

Results

Table 3 and Figure 3: Results of the cost-effectiveness deterministic analysis

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Cost (CAD)</th>
<th>Incremental Cost (CAD)</th>
<th>Effectiveness Incremental Effectiveness (QALYs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 line RTX</td>
<td>$74,472</td>
<td>$3.88</td>
<td>More QALYs at high risk of failure</td>
</tr>
<tr>
<td>2 line ADA</td>
<td>$90,738</td>
<td>$16,266</td>
<td>3.83</td>
</tr>
<tr>
<td>2 line ETA</td>
<td>$91,362</td>
<td>$16,890</td>
<td>3.54</td>
</tr>
<tr>
<td>2 line INF</td>
<td>$107,010</td>
<td>$32,538</td>
<td>3.27</td>
</tr>
</tbody>
</table>

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- This cost-effectiveness analysis is based on a "real world" data on costs and effectiveness of a second-line therapy with rituximab compared to 3 anti-TNFs (adalimumab, etanercept, and infliximab). Based on results of this analysis, over 6-year follow-up the second-line rituximab therapy tends to be more effective and less costly (i.e., dominant) than the three anti-TNFs.

Conclusion

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