BACKGROUND & IMPORTANCE

- Early switch from intravenous (IV) to oral therapy of bioequivalent drugs has major advantages, but remains challenging.
- Different strategies have been tested over the years to overcome barriers as prescribers’ misconceptions, practical and organizational concerns.
- We aimed to develop, validate and investigate the effect of an advanced computerized algorithm for IV to oral switch (IVOS), as part of a centralized pharmacist-led medication review service.

METHODS (Figure 1)

- The intervention targeted paracetamol and 10 bioequivalent antibiotics.
- Based on a definite set of criteria for IVOS, obtained by a literature search and validated by a multidisciplinary expert panel, 2 clinical rules were developed to identify patients with potentially inappropriate IV prescriptions (PIVs).
- Process validation was performed determining the rule effectiveness and positive predictive value (PPV).
- Post-intervention, the clinical rule alerts were reviewed by pharmacists who provided recommendations to switch in case of eligibility.
- An interrupted time series (ITS) study was performed to compare the number of residual PIVs between the pre-intervention and post-intervention period.
- The total number of recommendations, acceptance rate and financial impact were recorded for the 8-month post-intervention period.

RESULTS

- Literature search & content validation revealed 13 switch criteria (Table 1).
- Process validation yielded a PPV of 99% and rule effectiveness of 84%.
- Figure 2 shows the proportion of residual PIVs during the ITS study period. At baseline, the median proportion of residual PIVs was 66% with a median number of 11 residual PIVs per day. After the intervention, the median proportion and median number dropped, respectively, to 17% and 3.
- Post-intervention, the number of residual PIVs was 21% (β=0.21; 95% CI 0.13-0.32) of the pre-intervention number. The advanced IVOS algorithm showed a significant reduction of 79% (p<0.01) in the number of residual PIVs (Table 2).
- Neither a significant underlying time trend was observed during both pre- (β1, p=0.32) and post-intervention period (p=0.34), nor a significant difference when comparing pre- and post-intervention trends (β2, p=0.38) (Figure 2, Table 2).
- During an 8-month period, 1091 recommendations were provided of which 74% were accepted, resulting in a one-day cost saving of €4664.20.
- Prioritizing the IVOS algorithm for paracetamol during the global COVID-19 pandemic was helpful in preventing shortages of IV paracetamol.

Table 2. Model summary

<table>
<thead>
<tr>
<th>Category</th>
<th>Estimate</th>
<th>Standard error</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept (β0)</td>
<td>0.68</td>
<td>0.11</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Pre-intervention trend (β1)</td>
<td>1.00</td>
<td>&lt;0.01</td>
<td>0.32</td>
</tr>
<tr>
<td>Change in level after intervention (β2)</td>
<td>0.21</td>
<td>0.23</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Post-intervention trend</td>
<td>1.04</td>
<td>0.34</td>
<td></td>
</tr>
<tr>
<td>Change in trend after intervention (β3)</td>
<td>1.04</td>
<td>0.04</td>
<td>0.38</td>
</tr>
</tbody>
</table>

CONCLUSION & RELEVANCE

- Our study showed that the advanced IVOS algorithm combined with a pharmacist-led medication review improved switch therapy of bioequivalent drugs impressively.
- The rules can easily be transferred to or replicated in other Belgian hospitals, to support a widespread use.
- Given the almost perfect rule effectiveness and high PPV, the service may have the potential to evolve as a stand-alone CDSS-feature without pharmacist interference to realize switching at the actual moment of prescribing.