Background & Objective

- Pharmacological management of schizophrenia remains a challenge, as only about half of patients respond well to the initial regimen and can tolerate it. The remaining patients either do not respond, or experience intolerable side effects or both.
- Prescribers lack tools to determine the root cause of treatment failure for these complicated courses and respond accordingly (Figure 1).
- Management based on clinical presentation alone is only unsatisfactory for patients with intolerable side effects and lack of response as they need to be switched to another drug.
- The objective of the project is to estimate potential cost savings of point-of-care testing of antipsychotic plasma levels as a possible solution to guide treatment decisions.

Figure 1: Decision tree under current state of care (solid lines) and with access to plasma level information (dotted lines)

Methods

- Literature review to obtain frequency estimates for root causes of nonresponse and intolerable side effects.
- Literature review to obtain estimates for the excess healthcare cost of schizophrenia care for non-adherent and poorly controlled patients.
- Expensive in annual cost in 2015 US$.
- Simulation model to estimate annual excess cost of schizophrenia care assuming treatment decisions based on knowledge of plasma levels compared to current state of care assuming that prescribers use one of the following three hypothetical decisions strategies:
  - Treatment based on published estimates of actual decisionmaking
  - Treatment of all causes based on the most common root cause
  - Treatment based on applying the underlying distribution of causes randomly

Results

Based on literature estimates, about 50% of patients respond to the initially selected regimen and are able to tolerate the drug (Figure 2).

- 25% of patients do not respond.
- 15% have intolerable side effects.
- 6% experience both.

Figure 2: Estimated frequency distribution of responses to initial treatment regimen

Table 1: Estimated frequency of underlying causes for inadequate treatment response

<table>
<thead>
<tr>
<th>Clinical Presentation</th>
<th>% of patients</th>
<th>% of response</th>
<th>% of intolerable side effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment response</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-respondent</td>
<td>25%</td>
<td>0%</td>
<td>6%</td>
</tr>
<tr>
<td>Treatment resistant</td>
<td>15%</td>
<td>0%</td>
<td>6%</td>
</tr>
<tr>
<td>Intolerable side effects</td>
<td>6%</td>
<td>0%</td>
<td>6%</td>
</tr>
</tbody>
</table>

Conclusions

Without information on antipsychotic plasma levels, prescribers are estimated to make incorrect decisions in 10-15% of the approximately 40% of patients with schizophrenia and complicated treatment courses i.e. patients who do not respond to initial treatment or experience intolerable side effects to it. For patients with lack of treatment response, the incorrect decision would lead to avoidable annual cost of $819 to $1,512, and for patients with intolerable side effects of $490 to $1,383.

The findings imply that plasma level testing in patients with complicated treatment courses would be less cost-neutral, if the cost of a single test was between $91 and $1,012.

Limitations

- As in all modeling studies, we combined parameter estimates derived from studies of different populations, which may have introduced errors and even bias.
- We assume that correct determination of the root cause of non-response and intolerable side effects allows managing the patient property. This may lead to overestimate the savings from plasma level monitoring.
- The number of high-quality studies that allocate excess cost of care for patients with complicated treatment courses is limited.

Implications

Access to point of care antipsychotic plasma levels would help avoid incorrect management decisions in 10-15% of the complicated treatment courses and has the potential to improve disease management and reduce healthcare costs.

Table 2: Estimated frequency of underlying causes for patients with treatment response but intolerable side effects

<table>
<thead>
<tr>
<th>Clinical Presentation</th>
<th>% of patients</th>
<th>% of response</th>
<th>% of intolerable side effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment response</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-respondent</td>
<td>25%</td>
<td>0%</td>
<td>6%</td>
</tr>
<tr>
<td>Treatment resistant</td>
<td>15%</td>
<td>0%</td>
<td>6%</td>
</tr>
<tr>
<td>Intolerable side effects</td>
<td>6%</td>
<td>0%</td>
<td>6%</td>
</tr>
</tbody>
</table>

Table 3: Estimation of risk of incorrect treatment assignment in the balance of chances to plasma levels

<table>
<thead>
<tr>
<th>Clinical Presentation</th>
<th>% of treatment</th>
<th>% of plasma level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment response</td>
<td>75%</td>
<td>25%</td>
</tr>
<tr>
<td>Treatment resistant</td>
<td>75%</td>
<td>25%</td>
</tr>
</tbody>
</table>

Table 4: Estimated cost impact of incorrect treatment (in 2015 US$)

<table>
<thead>
<tr>
<th>Clinical Presentation</th>
<th>% of patients</th>
<th>% of response</th>
<th>% of intolerable side effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment response</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-respondent</td>
<td>25%</td>
<td>0%</td>
<td>6%</td>
</tr>
<tr>
<td>Treatment resistant</td>
<td>15%</td>
<td>0%</td>
<td>6%</td>
</tr>
<tr>
<td>Intolerable side effects</td>
<td>6%</td>
<td>0%</td>
<td>6%</td>
</tr>
</tbody>
</table>

Table 5: Estimated potential savings in cost of schizophrenia care per patient-year (in 2015 US$)

- $6,000
- $4,000
- $2,000
- $0
- $1,512
- $801
- $43
- $461
- $43

References

1. Janssens Diagnostic, Titusville, NJ, USA; RAND Health, Boston, MA, USA