Description of Automated Logic Analysis Toolkit

Figure 1: User Interface displaying Tabular Logic from 2010 Position Statements

Main Features
- User can formulate and easily modify the logic by inserting N, O, A, and S into the applicable cell.
- User can modify the criteria included in a logic statement and test the impact on overlap within and between reportable diseases.
- The tool can be used to evolve logic for any reportable event.
- The tool is user-friendly. It accepts Excel files as input.

Table 1: Distribution of induced false reports for detecting variants of hepatitis

<table>
<thead>
<tr>
<th>Type of Hepatitis simulated</th>
<th>Proportion of reports that came true for each reportable event</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Overlap Ratio</td>
<td># of total overlapping outputs/# of total tests performed</td>
</tr>
<tr>
<td>Proportion of reports that came true for each reportable event</td>
<td></td>
</tr>
<tr>
<td>Type of Hepatitis simulated</td>
<td>Hep A</td>
</tr>
<tr>
<td>Total Overlap Ratio</td>
<td>100%</td>
</tr>
<tr>
<td>Proportion of reports that came true for each reportable event</td>
<td></td>
</tr>
</tbody>
</table>

Findings

1. Tabular logic can be unnecessarily complex
   - Sufficient conditions often superseded Necessary and Optional conditions. For example, for hepatitis A, column 2 and 3 are not necessary given the criteria in column 1. By removing the superseded conditions, we reduce the number of required potential duplicate reports.

2. Tabular logic can be true for more than one disease
   - We encountered major overlap in the logic within the B and C hepatitis variants: Acute B versus Chronic B (51.61%), Acute C versus Past and Present C (89.99%). (See Table 1).
   - Positive HbsAg will trigger report for Acute and Chronic hepatitis B.

3. Tabular logic can be inconsistent with narrative logic
   - In the process of structuring logic, we found inconsistencies between the tabular logic and narrative criteria among hepatitis diseases. We found the clinical criteria to be ambiguous and conflicting in the various position statements.

4. Tabular logic violate guiding principles
   - Clinical condition criteria is not unique, for example, rows 0-3 and 23-24 in the Figure 1.
   - Optional criteria do not always occur with N