Validation of the Flu Score in a Young Adult Population
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Background: the Flu Score
- Originally developed using data from two previous studies of 459 outpatient adults with suspected influenza (Nicolas Senn and Ralph Gonzales, collaborators)
- PCR or culture as reference standard
- Logistic regression used to identify independent predictors using 70% of data
- Internally validated using 30% of data

Study Aim
- Validate the Flu Score in our young adult population and compare to other data sets.

Setting and Data Collection
- University of Georgia University Health Center primarily serves 35,000 students ages 18 to 25 years
- Recruited young adults with clinically suspected influenza
- All students self-reported symptoms using an online portal prior to the visit.
- Physicians use a standard template that mandates collection of key respiratory signs and symptoms, including all elements of the Flu Score.
- Obtained nasopharyngeal sample
- Novel point of care PCR test (Cobas LIAT Roche Medical Diagnostics) performed on all patients as the reference standard (99% sens, 100% spec)

Analysis
- Calculated Flu Score for each patient who received PCR testing
- Determined the likelihood of PCR positive influenza A or B for low, moderate and high risk groups by the Flu Score
- Compared this with original study and previous validation studies
- Performed meta-analysis of stratum specific likelihood ratios, in Stata

Results
Our study (UGA Health Center)

<table>
<thead>
<tr>
<th>Risk group (points)</th>
<th>Flu</th>
<th>No flu</th>
<th>% flu</th>
<th>LR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low risk (0-2)</td>
<td>14</td>
<td>56</td>
<td>20%</td>
<td>0.24</td>
</tr>
<tr>
<td>Moderate risk (3)</td>
<td>12</td>
<td>18</td>
<td>40%</td>
<td>0.65</td>
</tr>
<tr>
<td>High risk (4-6)</td>
<td>119</td>
<td>68</td>
<td>64%</td>
<td>1.71</td>
</tr>
</tbody>
</table>

Overall prevalence: 50%, Diagnostic odds ratio: 7.1, % classified low risk: 24%

Original dataset (Switzerland and San Francisco)

<table>
<thead>
<tr>
<th>Risk group (points)</th>
<th>Flu</th>
<th>No flu</th>
<th>% flu</th>
<th>LR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low risk (0-2)</td>
<td>12</td>
<td>137</td>
<td>8.0%</td>
<td>0.17</td>
</tr>
<tr>
<td>Moderate risk (3)</td>
<td>39</td>
<td>90</td>
<td>30.2%</td>
<td>0.83</td>
</tr>
<tr>
<td>High risk (4-6)</td>
<td>106</td>
<td>75</td>
<td>58.6%</td>
<td>2.72</td>
</tr>
</tbody>
</table>

Overall prevalence: 34%, Diagnostic odds ratio: 16, % classified low risk: 32%

European GRACE validation dataset

<table>
<thead>
<tr>
<th>Risk group (points)</th>
<th>Flu</th>
<th>No flu</th>
<th>% flu</th>
<th>LR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low risk (0-2)</td>
<td>111</td>
<td>1035</td>
<td>9.7%</td>
<td>0.60</td>
</tr>
<tr>
<td>Moderate risk (3)</td>
<td>95</td>
<td>352</td>
<td>21.2%</td>
<td>1.51</td>
</tr>
<tr>
<td>High risk (4-6)</td>
<td>67</td>
<td>141</td>
<td>32.2%</td>
<td>2.66</td>
</tr>
</tbody>
</table>

Overall prevalence: 15%, Diagnostic odds ratio: 4.4, % classified low risk: 64%

Conclusions
- Previous meta-analyses usually just dichotomize risk scores with 3 or more groups, i.e (Low or Moderate) vs High, or Low vs (Moderate or High)
- Approach: a likelihood ratio is a type of risk ratio, so we reformatted data as risk ratios and used a standard meta-analytic procedure for risk ratios in meta-analysis of RCTs.

Forest Plot

Summary Estimates
- Low risk: 0.30 (0.12 - 0.74)
- Mod risk: 0.99 (0.59 - 1.7)
- High risk: 2.3 (1.7 - 3.2)

Diagnostic odds ratio: 7.7

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References available upon request.