Clinical prediction guide

Several simple rules predicted complications in high risk patients with diabetes


QUESTION: What is the accuracy of a prediction rule for identifying patients with diabetes mellitus who are at high short term risk for macro- and microvascular events, infectious disease, and metabolic complications?

Patients
57,722 members of the HMO who were $\geq$ 19 years of age, had diabetes, and were continuously enrolled in the health plan during the 2 year baseline period. The derivation dataset included 28,858 patients (mean age 61 y, 53% men), and the validation dataset included 28,884 patients (mean age 61 y, 52% men).

Description of prediction guide
A “best” model and 4 simpler approaches were derived: the previous events strategy (identifies patients with previous events or related outpatient diagnoses during the baseline period), the first 3 variables of the “best” model, the numerical risk score (a summed score obtained by replacing significant model coefficients with integer values: 1.0 for a significant multivariate odds ratio [OR] between 1.1 and 1.49, 2.0 for an OR between 1.50 and 1.99, and 3.0 for an OR $\geq$2, with corresponding negative numbers for significant ORs $<1.0$), and ranking on the basis of average HbA1c concentration during baseline.

Main outcome measures
Identification of patients at high short term risk for macro- and microvascular, infectious, and metabolic complications.

Main results
Comparisons of the test properties of the various models for predicting each type of complication are summarised in the table.

Conclusion
Simple prediction rules were better than HbA1c concentrations for identifying patients with diabetes who were at high short term risk for complications.

Test properties of 5 models for predicting complications in diabetes (validation dataset)*

<table>
<thead>
<tr>
<th>Model</th>
<th>Micro- and macrovascular</th>
<th>Infectious disease</th>
<th>Metabolic</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sens</td>
<td>Spec</td>
<td>+LR</td>
</tr>
<tr>
<td>Best models‡‡</td>
<td>72%</td>
<td>73%</td>
<td>2.68</td>
</tr>
<tr>
<td>Previous events</td>
<td>72%</td>
<td>72%</td>
<td>2.57</td>
</tr>
<tr>
<td>3 variables‡‡</td>
<td>71%</td>
<td>73%</td>
<td>2.63</td>
</tr>
<tr>
<td>HbA1c, concentration‡‡</td>
<td>31%</td>
<td>70%</td>
<td>1.04</td>
</tr>
</tbody>
</table>

*Sens = sensitivity; Spec = specificity. Diagnostic terms defined in glossary. Data on specificity, +LR, and −LR provided by author.
‡‡The “best” models for predicting complications included predictors from the following categories: patient demographics, previous diagnoses of complications, metabolic measurements, medication, and healthcare utilisation measures.
‡‡‡Cut point of patients with the highest 30% of predicted risk scores.