Monitoring of Asthma control in Primary Care

Comparison of the simple form of the Royal College of Physicians 3 questions (RCP-3Q's) for asthma with an expanded scoring system.

Background
• Asthma is a complex disease that for most patients can be successfully managed.
• Treatment depends on the ability to assess the level of symptoms and predict loss of control.
• Current guidelines recommend use of a variety of simple, standardised control assessment tools.
• There is currently no consensus on the most appropriate tool to use in primary care.
• In the UK current Quality Outcome Framework requirements necessitates the use of the Royal College of Physicians 3 questions for asthma.
• How this tool is used may have a bearing on the quality of the assessment.

Objective
To compare the reliability of the simple form of the RCP-3Q’s compared with the predictive ability of other defined assessment models including an expanded RCP-3Q scoring model.

Methods

Based on a review of the literature and utilising data from an existing UK primary care asthma dataset of patients aged 13+ years collected between 2001-2006, 8 binary (Yes = poor control, No = good control) models of asthma control were constructed.

For each model multiple logistic regression (accounting for practice clustering of patients) was performed to identify the most predictive items of poor control. The models were assessed for goodness-of-fit statistics using Pseudo R-squared and Akaike Information Criterion (AIC), and for performance using Area Under the Receiver Operator Characteristic (AUROC).

In addition, an expanded RCP-3Q control scale was derived. Each question was allocated a score of 0 (no symptoms) to 3 (daily symptoms), giving a score range of 0 to 9. This expanded scale model was assessed with linear modelling.

The analysis identified which model was best explained by the independent variables and thus could be considered a good model of control assessment.

Results

1205 UK wide practices provided data on 64,929 patients aged 13+ years.

Eight binary control models were investigated (Table 3).

• The RCP-3 Questions model provided the best fit statistically with:
  • the second lowest AIC
  • the highest pseudo R-squared (amount of explained variability) of 18%
  • an AUROC of 0.79
• By contrast, the composite model based on the GINA definition of controlled asthma had:
  • a higher AIC
  • an AUROC of 0.72
  • only 10% variability explained.
• The PEFR model had the:
  • lowest AIC
  • an AUROC of 71%
  • only 6% of variability explained.

Compared with the RCP-3Qs binary model, the linear RCP-3Q Total Score Model (Scale 0-9), was found to be a more robust tool for assessing asthma control with a lower AIC (28,6163) and an R-squared of 33%.

Conclusions
• Practical guidance on the best method to monitor and assess asthma control is required.
• Single component measures are not effective for identifying poor control.
• Statistical modelling found the RCP 3 Questions was the ‘best fit’ for determining asthma control in a routine review consultation.
• An expanded RCP-3Q scoring system is a more sensitive method for assessing control than a simple binary assessment and should be incorporated into the assessment process.

Table 2: Variables used for regression modeling.

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<thead>
<tr>
<th>Patient Variables</th>
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<tbody>
<tr>
<td>Control Model</td>
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<tr>
<td></td>
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<tr>
<td>Variable</td>
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<tr>
<td>RCP-3Q model</td>
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<td>RCP-3Q model</td>
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Table 3: Performance of multiple regression models.

<table>
<thead>
<tr>
<th>Control Model</th>
<th>Area Under ROC Curve</th>
<th>95% CI</th>
<th>95% CI</th>
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<tbody>
<tr>
<td>RCP-3Q model</td>
<td>0.79</td>
<td>0.78, 0.81</td>
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Results for patients were representative of genders, all ages, and the full range of asthma severity (Table 1).

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