Symptoms and signs plus erythrocyte sedimentation rate or C-reactive protein predicted pneumonia in lower respiratory tract infection


Clinical impact ratings GP/FP/Primary care Infectious disease Respiratory

Q In adults with a lower respiratory tract infection (LRTI), which symptoms, signs, and tests best inform the diagnosis of pneumonia?

METHODS

- **Diagnosis:** blinded comparison of chest radiographs with general practitioner (GP) assessment.
- **Setting:** 15 general practices (25 GPs) in the Netherlands.
- **Patients:** 246 patients aged ≥18 years (mean age 52 y) presenting to a GP with an LRTI. Exclusion criteria included severe clinical disease, recent antibiotic treatment, or hospital admission for respiratory disease.
- **Description of tests:** the clinical status of patients classified as either pneumonia or other LRTI was based on clinical symptoms and signs, and C-reactive protein (CRP) and erythrocyte sedimentation rate (ESR) blood tests.
- **Diagnostic standard:** chest radiography (lateral and postero anterior) was used as the diagnostic standard for identifying pneumonia.
- **Outcomes:** diagnostic characteristics for the performances of the CRP and ESR blood tests, and the final multivariate models.

MAIN RESULTS

32 (13%) patients were diagnosed with pneumonia by chest radiography. The classical symptoms and signs of pneumonia (dyspnoea, thoracic pain, self reported fever, respiratory rate >20/ min, percussion dullness, crackles, and the clinical diagnosis of pneumonia) were not predictive of pneumonia. The final “symptoms and signs” (SS) model used to predict pneumonia included the variables dry cough, diarrhoea, and temperature >38°C. The areas under the ROC curves were 0.87 for the CRP test, 0.77 for the ESR test, 0.70 for the SS model, 0.90 for the SS plus CRP model, and 0.81 for the SS plus ESR model. The table shows the diagnostic characteristics for various cutoffs for the CRP and ESR tests. Applying a prediction rule for patients at low risk of pneumonia (maximum of 1 positive score on the 3 items dry cough, diarrhoea, and temperature >38°C; and a CRP value <20 mg/l), 80 of the 193 antibiotic prescriptions could have been prevented.

CONCLUSIONS

In adults with a lower respiratory tract infection, classical symptoms and signs of pneumonia were not predictive of pneumonia. A model consisting of dry cough, diarrhoea, and temperature >38°C plus erythrocyte sedimentation rate or C-reactive protein (CRP) best predicted pneumonia. The prediction rule for patients at low risk of pneumonia, including a CRP value <20 mg/l, can reduce antibiotic overprescribing in general practice.

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Diagnostic characteristics of C reactive protein (CRP)

<table>
<thead>
<tr>
<th>Tests</th>
<th>Sensitivity (95% CI)</th>
<th>Specificity (CI)</th>
<th>LR+</th>
<th>LR-</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRP ≥10</td>
<td>97% (84 to 100)</td>
<td>31% (25 to 38)</td>
<td>1.4</td>
<td>0.10</td>
</tr>
<tr>
<td>CRP ≥20</td>
<td>91% (75 to 98)</td>
<td>51% (44 to 57)</td>
<td>1.8</td>
<td>0.19</td>
</tr>
<tr>
<td>CRP ≥50</td>
<td>88% (71 to 97)</td>
<td>75% (70 to 81)</td>
<td>3.6</td>
<td>0.17</td>
</tr>
<tr>
<td>ESR ≥10</td>
<td>97% (84 to 100)</td>
<td>29% (23 to 35)</td>
<td>1.4</td>
<td>0.11</td>
</tr>
<tr>
<td>ESR ≥20</td>
<td>78% (60 to 91)</td>
<td>57% (51 to 63)</td>
<td>1.8</td>
<td>0.38</td>
</tr>
<tr>
<td>ESR ≥40</td>
<td>59% (41 to 76)</td>
<td>85% (80 to 90)</td>
<td>3.9</td>
<td>0.48</td>
</tr>
</tbody>
</table>

*Diagnostic terms defined in glossary: Sensitivity, specificity, and CIs provided by author; LR+ and LR- calculated from data provided by author.