Does this patient have community-acquired pneumonia: diagnosing pneumonia by history and physical examination

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Authors' objectives
To assess the performance of the clinical history and the physical examination in the diagnosis of community-acquired pneumonia (CAP).

Searching
MEDLINE was searched from 1966 to October 1995 for English language medical literature; the search strategy is available from the authors. The reference lists of retrieved articles were also reviewed.

Study selection
Study designs of evaluations included in the review
Initially, case series with less than 10 observations and review articles without original data were excluded. Of the initial included articles, only primary prospective studies of the accuracy or precision of the clinical examination in CAP (studies rated as level I quality) were included in the main analyses. For accuracy studies, this required independent, blind comparisons of findings with a 'gold' standard of diagnosis or aetiology among a large number (greater than 50) of consecutive patients suspected of having CAP. For precision studies, this required at least two independent blinded raters of symptoms or signs in patients suspected of having CAP.

Specific interventions included in the review
The included studies had to use the clinical history and/or physical examination as the index test.

Reference standard test against which the new test was compared
No inclusion criteria relating to the reference standard were specified. The reference standard used in the four studies included in the main analysis was chest radiography; the diagnosis of pneumonia required the identification of a new infiltrate on a chest radiograph.

Participants included in the review
Studies of patients suspected of having CAP, who were aged over 16 years and who did not have known immunosuppression or nosocomial infections, were eligible for inclusion.

Outcomes assessed in the review
No inclusion criteria relating to the outcome measures were specified. The outcome measures reported in the review were the mean pair observer agreement rates and kappa values as measures of precision, and the positive and negative likelihood ratios (LRs) as measures of accuracy. Positive and negative predictive values were also discussed in the text.

How were decisions on the relevance of primary studies made?
Two of the authors applied the initial inclusion criteria.

Assessment of study quality
The studies were assessed using a methodological quality filter. A level of evidence from I to V was assigned to each study, based on its internal validity. One author evaluated each article using the methodological quality filter.

Data extraction
The authors did not state how the data were extracted for the review, or how many reviewers performed the data extraction.
Methods of synthesis

How were the studies combined?
There was no meta-analytical pooling of the studies. LRs were calculated for the presence (positive LR) or absence (negative LR) of individual clinical findings for each study. Only those findings significantly associated with the presence or absence of pneumonia in at least one study, based on a 2-tailed chi-squared or Fisher exact test with a P-value of less than 0.05, were included in the results.

How were differences between studies investigated?
Differences between the studies were investigated by discussion of the study characteristics. In particular, the potential impact of selection bias on diagnostic accuracy was emphasised.

Results of the review

No level I studies evaluating precision were identified. One study addressing the reliability among physicians in the examination of patients with a variety of respiratory conditions was discussed in the text. Four studies addressing diagnostic accuracy of history and physical examination were judged to have level I evidence and were included in the main analysis. The number of included patients was not reported.

The prevalence of pneumonia ranged from 2.6 to 38.3% across the four studies. No single item in the clinical history raised the odds of pneumonia high enough to confirm a diagnosis without a chest radiograph.

Accuracy of physical examination: the LRs for the presence of any individual vital sign of abnormality ranged from 2 to 4; varying the cut-off point for the abnormalities did not have a substantial impact on these values. The individual LRs for the absence of any vital sign of abnormality ranged from 0.5 to 0.8. One study demonstrated a negative LR of 0.18 (95% confidence interval: 0.07, 0.46) for the absence of all three vital sign abnormalities. Based on this finding, for an assumed prevalence of 5%, a patient without any vital sign abnormalities would have a predicted probability of pneumonia of less than 1%. The presence of several individual findings on chest examination significantly increased the positive LRs, but the usefulness of these findings was limited by the low prevalence of pneumonia in the overall study populations.

Authors’ conclusions

There were no individual clinical findings or combinations of findings that could 'rule in' the diagnosis of pneumonia. However, some studies have shown that an absence of any vital sign of any abnormalities on chest auscultation substantially reduces the likelihood of pneumonia to a point where further diagnostic evaluation may be unnecessary. If diagnostic certainty is required in the management of a patient with suspected pneumonia, chest radiography should be performed.

CRD commentary

The review addressed a clear research question, which was defined by appropriate inclusion criteria. The restriction of the search strategy to a single database and English language publications may well have resulted in incomplete retrieval of the available literature. No consideration was given to unpublished literature, and no assessment of publication bias was reported. There were almost no details of the individual included studies, making it very difficult to assess the circumstances to which findings may be applicable. The validity assessment was limited to a level of evidence scale, which was then used to exclude studies; it was unclear how many studies were excluded at this stage of the review. No attempt was made to pool the studies, and between-study heterogeneity, though discussed in a limited way in the text, was not formally assessed. Since levels of evidence provide only a crude measure of quality, it may have been more useful not to exclude studies on the basis of quality. The authors’ conclusions follow broadly from the data presented given the limitations outlined.

Implications of the review for practice and research

Practice: The authors stated that if diagnostic certainty is required in the management of a patient with suspected
pneumonia, then chest radiography should be performed.

Research: The authors stated that future research should examine ways to improve the precision of the clinical examination in patients with suspected pneumonia, as well as to determine the accuracy of the clinical examination in these patients in settings outside the emergency department. In addition, studies should address appropriate thresholds for obtaining chest radiographs and treating accordingly versus empirical antimicrobial therapy versus clinical observation, in the management of patients with suspected CAP.

Bibliographic details
Metlay J P, Kapoor W N, Fine M J. Does this patient have community-acquired pneumonia: diagnosing pneumonia by history and physical examination. JAMA 1997; 278(17): 1440-1445

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Other publications of related interest
This additional published commentary may also be of interest. Hensley MJ. Review: clinical assessment is inaccurate for diagnosing community acquired pneumonia. Evid Based Med 1998;3:89.

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Record Status
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.