Management of acute pharyngitis in adults: reliability of streptococcal test and clinical findings
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Record Status
This is a critical abstract of an economic evaluation that meets the criteria for inclusion on NHS EED. Each abstract contains a brief summary of the methods, the results and conclusions followed by a detailed critical assessment on the reliability of the study and the conclusions drawn.

Health technology
This study assessed the use of rapid streptococcal antigen tests (RSATs) for diagnosing pharyngitis in a primary care setting. The RSAT in question was an optical enzyme-linked immunosorbent assay. The study focused on the ability of the RSAT to identify patients with Group A streptococcal pharyngitis (GASP) and to improve appropriate use of antibiotics. The authors compared the performance of RSATs with the 'gold' standard of throat culture for identifying GASP.

Type of intervention
Diagnosis.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised patients aged 15 years or older who exhibited at least 2 of the 4 clinical criteria for pharyngitis. The clinical criteria for acute pharyngitis were defined according to Centor et al. 1981 (see 'Other Publications of Related Interest' below for bibliographic details), specifically, temperature of 38 degrees Celsius or higher, tonsillar exudates, tender cervical adenopathy, and no cough or rhinitis.

Setting
The setting was primary care. The economic study was carried out in Geneva, Switzerland.

Dates to which data relate
The effectiveness and resource use data referred to 1999 to 2001. The price year was 2002.

Source of effectiveness data
The effectiveness data were derived from a single study.

Link between effectiveness and cost data
The resource use data were gathered prospectively from the same patient sample as that used in the effectiveness study.

Study sample
The authors did not report any power calculations. The study recruited consecutive patients presenting at the clinic. The study included 372 patients. The median age of the patients was 29.6 (+/- 9.5) years, with a slight female
predominance (55.1%). No patients refused to participate in the study.

**Study design**
The study was a diagnostic accuracy study that was conducted in a single centre. Physicians were trained to use the RSAT and performed systematic RSAT and throat culture in all patients. They prescribed antibiotics immediately to patients with positive RSAT results, and within 48 hours to patients with positive throat culture results.

**Analysis of effectiveness**
The primary outcome was the diagnostic performance of RSATs, as described by sensitivity, specificity, predictive values and likelihood ratios. Sensitivity, specificity, and negative and positive predictive values were assessed using the Newcombe-Wilson method without continuity correction (Newcombe 1998, see 'Other Publications of Related Interest' below for bibliographic details).

**Effectiveness results**
The sensitivity of RSAT (compared with throat culture) was 91.4% (95% confidence interval, CI: 86 to 95) and the specificity was 95.3% (95% CI: 92 to 97).

The positive predictive value was 92.1% (95% CI: 86 to 96) and the negative predictive value 94.9% (95% CI: 91 to 97).

The positive likelihood ratio was 19.3 (95% CI: 11 to 34) and the negative likelihood ratio 0.09 (95% CI: 0.05 to 0.16).

**Clinical conclusions**
The authors concluded that RSAT performs well as a diagnostic tool for acute pharyngitis, particularly when combined with the Centor clinical score.

**Modelling**
A decision tree was used to calculate the amount of antibiotic use, the amount of appropriate antibiotic use, the amount of inappropriate antibiotic use, and the costs that could have been incurred with each of the five potential strategies examined. The time horizon of the model was unclear.

**Measure of benefits used in the economic analysis**
The measure of benefits used was the proportion of patients appropriately treated.

**Direct costs**
The costs and the quantities were reported separately. The study included direct costs to the health service (i.e. the cost of penicillin treatment, RSAT and throat culture). The quantities of resources used were derived from the clinical study. The source of the unit cost data was unclear. Discounting was not relevant given the short timeframe of the analysis. The study reported the average costs. The authors excluded the costs of the consultation and symptomatic treatment, as these were assumed to be identical across all five strategies. The price year was stated as being 2002.

**Statistical analysis of costs**
The resource use data from the effectiveness study were not analysed stochastically. This was appropriate as the use of tests was protocol driven and antibiotic use was not measured directly.
**Indirect Costs**
The indirect costs were not included in the analysis. This would be appropriate if the perspective was that of a health care payer.

**Currency**
US dollars ($). These were converted from Swiss francs, but the exchange rate used was not reported.

**Sensitivity analysis**
The authors performed a one-way sensitivity analysis to test the robustness of the study findings to variations in the prevalence of GASP, the sensitivity and specificity of RSAT, the costs of antibiotics and the sensitivity of throat culture.

**Estimated benefits used in the economic analysis**
The strategy of symptomatic treatment without diagnostic tests was associated with appropriate treatment in 62.4% of patients. The strategy of systematic RSAT was associated with appropriate treatment in 93.8% of patients. The strategy of selective RSAT in patients with 2 or 3 clinical criteria for pharyngitis and empirical antibiotic use in patients with 4 clinical criteria was associated with appropriate treatment in 87.8% of patients. The strategy of empirical antibiotic treatment in all patients was associated with appropriate treatment in 58.6% of patients, while the strategy of systematic throat culture was associated with appropriate treatment in 100% of patients.

Side effects of antibiotic treatment and clinical consequences of untreated pharyngitis were not included in the analysis. This means that the study does not provide information about whether it is better to reduce inappropriate overuse of antibiotics or inappropriate under use.

**Cost results**
The authors did not report the total cost of each treatment strategy.

**Synthesis of costs and benefits**
The costs and benefits were combined to calculate the cost per case appropriately treated.

After removing strategies that were ruled out by dominance or extended dominance, the least costly and least effective strategy was symptomatic treatment without diagnostic tests.

The next most effective strategy was systematic RSAT, which had an average cost of $15.30 per patient appropriately treated.

Finally, systematic throat culture was the most costly and most effective strategy, with an average cost of $32.40 per patient appropriately treated.

The results did not prove sensitive to most sensitivity analyses.

**Authors' conclusions**
Selective use of a rapid streptococcal antigen test (RSAT) in patients with at least 2 clinical findings suggestive of Group A streptococcal pharyngitis (GASP) is a cost-effective strategy to reduce the overuse of antibiotics and to appropriately treat acute pharyngitis in adults in a primary care setting.

**CRD COMMENTARY - Selection of comparators**
The comparators were selected to reflect current clinical guidelines for the treatment of acute pharyngitis in adults.
You must consider whether these strategies would be applicable in your own setting.

**Validity of estimate of measure of effectiveness**
The measure of effectiveness was derived from a diagnostic accuracy study. However, the physicians in the study were trained to use RSATs. If this were not to be the case in general practice, then the study might overestimate the diagnostic accuracy of RSAT compared with throat culture. The authors acknowledged that throat culture is not an optimal 'gold' standard as it has a sensitivity of between 90 and 95%.

**Validity of estimate of measure of benefit**
The estimation of health benefits was modelled using a decision tree. Although the proportion of patients treated appropriately may be a valid outcome measure, it might have been more informative to differentiate between the benefits of reducing inappropriate overuse and inappropriate under use of antibiotics. In addition, throat culture was found to be more accurate in diagnosing pharyngitis but the results were not known for 48 hours, compared with instantaneous results for the RSAT. By not including measures of health-related quality of life, indirect costs or clinical consequences of pharyngitis, this delay is not valued in the study.

**Validity of estimate of costs**
The authors did not specify the perspective adopted in the economic analysis. They excluded the costs of the consultation and symptomatic treatment of pharyngitis since these were assumed to be common to each strategy. This is a reasonable assumption if the treatment of GASP with antibiotics would not reduce the need for symptomatic treatment. The costs and the quantities were reported separately, thus enhancing the reproducibility of the study in other settings. The resource use data were collected from a single study, but the costs of the alternative treatment strategies were modelled. Sensitivity analyses of the quantities and costs were conducted, but it was unclear from where the ranges were obtained. The authors also failed to report the source of the unit cost data, or the exchange rate used to convert Swiss francs into US dollars. This may limit the generalisability of the study results. The price year was reported, which will aid any future reflation exercises.

**Other issues**
The authors compared their findings with those from other studies. They stated that the non-experimental nature of their study and other studies may explain the variation in findings. Some previous studies found that systematic throat culture was more cost-effective than an RSAT. The authors stated that, as their results were not sensitive to variations in the costs, the results should be applicable to other countries. The total costs of each strategy were not reported, which may limit the interpretation of the study results. The authors' conclusions were not justified by the study results. The authors stated that selective RSAT is the best option for reducing overuse of antibiotics in patients with pharyngitis; however, the results showed that throat culture was more effective and more costly. As the authors had not defined a threshold value for the cost per patient treated appropriately, they cannot conclude which strategy is most cost-effective.

The authors stated that the study was subject to certain limitations. First, the theoretical effects of the strategies on antibiotic use were derived from a decision analysis model and not from a clinical study. Second, the study sample could be considered more severely ill than patients seen in community primary care practices. Third, in the clinical study, RSAT was conducted using two cultures, which is not reflective of clinical practice, although the authors stated that this should not affect the study results.

**Implications of the study**
The authors suggested that randomised controlled trials should be conducted to determine the most cost-effective treatment strategy for adults with pharyngitis.

**Source of funding**
Bibliographic details

Other publications of related interest


Indexing Status
Subject indexing assigned by NLM

MeSH
Acute Disease; Adolescent; Adult; Aged; Ambulatory Care; Anti-Bacterial Agents /economics /therapeutic use; Bacteriological Techniques /economics; Comparative Study; Drug Utilization /standards /statistics & numerical data; Enzyme-Linked Immunosorbent Assay /economics /methods; Female; Humans; Macrolides /economics /therapeutic use; Male; Middle Aged; Penicillin V /economics /therapeutic use; Pharyngitis /diagnosis /drug therapy /microbiology; Pharynx /microbiology; Predictive Value of Tests; Prospective Studies; Reproducibility of Results; Sensitivity and Specificity; Streptococcal Infections /diagnosis /drug therapy; Streptococcus /isolation & purification

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