Antibiotic prescription for acute sinusitis in otherwise healthy adults: clinical cure in relation to costs


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
Five clinical strategies for managing an otherwise healthy patient suspected of suffering from acute sinusitis, were considered: "wait and see", where the patient was advised to take analgesics for the headache and asked to return to the practice for antibiotic treatment after 1 week if symptoms did not improve; "selective prescription or clinical examination", where antibiotics were only prescribed to patients selected on the basis of clinical assessment; "antibiotics", where antibiotics were prescribed to all patients at their first visit; "ultrasound assessment", where antibiotics were only prescribed after a positive result on ultrasound investigation; and "radiographic assessment", where antibiotics were only prescribed after a positive result on radiographic assessment.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised all adults presenting to a medical practice who were suspected of suffering from acute sinusitis.

Setting
The setting was the community. The economic study was carried out in Leiden, The Netherlands.

Dates to which data relate
The effectiveness and resource data were obtained from studies published between 1992 and 1997. The price year was not reported.

Source of effectiveness data
The effectiveness data were derived from a review of published studies.

Modelling
A decision model was used to determine the costs and outcomes associated with each of the treatment options.

Outcomes assessed in the review
The following data were evaluated in the review:
diagnostic accuracy in terms of the sensitivity and specificity of clinical examination, radiography and ultrasound; and the probabilities of improvement, serious adverse events and recurrence of sinusitis, with and without antibiotics.

**Study designs and other criteria for inclusion in the review**
Both observational studies and controlled trials were included in the review. The inclusion criteria were not reported.

**Sources searched to identify primary studies**
Not reported.

**Criteria used to ensure the validity of primary studies**
Not reported.

**Methods used to judge relevance and validity, and for extracting data**
Not reported.

**Number of primary studies included**
Ten studies were included in the review.

**Methods of combining primary studies**
The data were derived largely on published meta-analyses.

**Investigation of differences between primary studies**
Not stated.

**Results of the review**
The sensitivities and specificities were, respectively, 0.58 and 0.88 for clinical examination, 0.83 and 0.88 for ultrasonography, and 0.99 and 0.75 for radiography.

The probabilities of improvement were 0.83 (with antibiotics) and 0.89 (without). The probabilities of serious adverse events were 0.00 (with antibiotics) and 0.034 (without), and the probabilities of a recurrence of sinusitis were 0.025 (with antibiotics) and 0.05 (without).

**Measure of benefits used in the economic analysis**
The benefit measure was the probability of clinical cure, defined as a reduction of symptoms to the extent that an additional week of antibiotics was not necessary.

**Direct costs**
The costs were not discounted since it was unnecessary under the circumstances (study period less than one year). The costs and quantities were not reported separately. The resource/cost boundary was not specified. The costs were based on the data and were modelled through a decision model.

The costs of antibiotic treatment, visit to a physician, and additional diagnostic procedures were included in the study. The cost of antibiotics was based on one week's treatment with doxycycline plus the pharmacist's fee and tax. The cost of the physician was based on a mean estimate of charges. The cost of further diagnosis was calculated by combining...
costs for equipment, medical materials, and personnel in a university hospital. The costs were measured in 1995 and 1996. No price year was used.

**Statistical analysis of costs**
No statistical analysis of costs was carried out.

**Indirect Costs**
Indirect costs were not included.

**Currency**
Dutch guilders (Dfl). The exchange rate was 1.30 Dfl = approximately UK1.

**Sensitivity analysis**
The stability of the analysis was tested over a range of assumptions, estimates and costs. One-way sensitivity analyses were carried out on the proportion of cases of sinusitis with a bacterial cause (range: 0 - 1), on the costs of antimicrobial treatment (range: 1 - 100 Dfl), and for the costs of being diseased for 1 week (range: 1 - 1,000 Dfl). A two-way sensitivity analysis was performed on the proportion of clinical cures after 1 week of treatment in the "wait and see" and "selective prescription" strategies.

**Estimated benefits used in the economic analysis**
After 1 week, the probability of cure was 91.50% for the "wait and see" option, 93.24% for the "clinical assessment" strategy, 93.99% for the "ultrasound assessment" intervention, 94.47% for the "radiographic assessment" option, and 94.50% for the "antibiotics" strategy.

**Cost results**
After 1 week, the average costs per cured patient were 44.15 Dfl for the "wait and see" option, 53.12 Dfl for the "clinical assessment" strategy, 187.21 Dfl for the "ultrasound assessment" intervention, 138.15 Dfl for the "radiographic assessment" option, and 71.60 Dfl for the "antibiotics" strategy. The costs of minor side-effects were not considered in the reported cost estimates, because they were not expected to generate additional costs.

**Synthesis of costs and benefits**
The costs and benefits were combined by calculating the incremental cost-effectiveness ratio, which indicates the costs for curing an additional patient as compared to the reference scenario (the "wait and see" option). The costs for curing one additional patient were 515.59 Dfl with the "clinical assessment" strategy and 881.67 Dfl with the "antibiotics" option, compared with the reference case. Diagnostic procedures were not considered cost-effective.

The sensitivity analyses tended to confirm the findings of the base-case analysis. By varying the proportion of cases with a bacterial cause, the "wait and see" option was always the most cost-effective. If the costs of the antibiotic treatment were equal to or less than 4 Dfl, the "selective prescribing" strategy was the most cost-effective. If the costs of the antibiotic treatment were higher than 4 Dfl, then the "wait and see" option offered the most convenient strategy. If the costs of having sinusitis for 1 week were higher than 548 Dfl, then the "selective prescribing" was the most cost-effective strategy, otherwise the "wait and see" strategy offered the lowest costs per cured patient. The two-way sensitivity analysis showed that "selective prescribing" was the most cost-effective option compared to "wait and see", but only if the probabilities of cure with antibiotics was higher than 90% and without antibiotics was lower than 65%.

**Authors' conclusions**
The results suggested that diagnostics are never cost-effective in the treatment of acute sinusitis. Short regimens or
cheap antibiotics, which are equally effective, should be prescribed for acute sinusitis.

**CRD COMMENTARY - Selection of comparators**
The choice of comparing several strategies for the treatment of acute sinusitis was based on the fact that various guidelines are present in clinical practice, and there is no agreement on the diagnosis and treatment of the disease.

**Validity of estimate of measure of benefit**
The principal input parameters for the model were derived from published meta-analyses, then modelled by means of a decision model, taking into account all the possible outcomes of the strategies. No information was provided on how these studies were identified and the criteria on which they were selected. Further information relating to the decision analytical model would have been useful.

**Validity of estimate of costs**
The cost estimates were likely to be appropriate given that sensitivity analyses were performed. However, since the authors did not state the perspective of the study, it is not possible to assess whether all relevant costs were included in the analysis. In addition, it is unclear how the costs of having sinusitis for one week were calculated, and whether this cost item could be considered an indirect cost. As the authors noted, it may not be appropriate to include productivity losses in considering treatments for short-term diseases.

**Other issues**
The methods used to calculate the costs per cured patient were not reported explicitly in the study. Moreover, some of the authors’ conclusions were based on average cost-effectiveness ratios rather than incremental ratios. It is also unclear why a strategy involving a cost equal to 516 Dfl (approximately 170) per additional cured patient is not considered a cost-effective option.

Overall, the sensitivity analyses showed that the model was fairly robust. However, the authors did not address the issue of generalisability to other settings, and they made no comparisons with the results of other studies.

**Implications of the study**
The authors suggested that the most rational clinical response to a suspected case of sinusitis is first "wait and see", with a "selective strategy by means of clinical assessment" as the next best option. Additional research should focus on whether sub-groups of patients would benefit from antibiotic treatment.

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