Impact of first-line vs second-line antibiotics for the treatment of acute uncomplicated sinusitis

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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
The use of newer and more expensive (second-line) antibiotics, compared with older and less expensive (first-line) antibiotics, to relieve the symptoms of acute sinusitis. Three first-line antibiotics and several second-line antibiotics were used. All were reported in the article along with their prevalence of use.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised patients with a diagnosis of acute sinusitis who were receiving initial antibiotic treatment. Patients were excluded if they were younger than 18 years, if they had an earlier diagnosis of acute sinusitis in the last 60 days, if they had received an antibiotic prescription within 60 days, or if they had a diagnosis of chronic sinusitis.

Setting
The setting was primary care.

Dates to which data relate
The effectiveness data were gathered from 1 July 1996 to 20 June 1997. No price year was reported.

Source of effectiveness data
The effectiveness data were derived from estimates of effectiveness based on opinion.

Link between effectiveness and cost data
The cost data were calculated retrospectively for the same patient sample as that used in the effectiveness study.

Study sample
Power calculations to determine the sample size were not specified. The study sample included insurance plan members who had an office visit with an accompanying International Classification of Diseases, Ninth Revision code, (IDC-9) dose for acute sinusitis and who also had 60 days of enrolment prior to, and 365 days after, the first sinusitis-associated office visit. The total number of participants was 29,102, of which 17,329 took first-line antibiotics and 11,773 took second-line antibiotics.
Study design
This was a retrospective cohort study using pharmaceutical data. The classification of a sinusitis episode was carried out retrospectively by the investigators. The investigators also collected data on physician type and symptomatic therapy since they considered these to be potential confounding factors.

Analysis of effectiveness
The analysis was conducted on all the patients entered into the study. The primary health outcomes were:

the absence of an additional claim for an antibiotic in the 28 days after the initial claim (overall success rate),

the presence of a claim for a second antibiotic in the 15- to 28-day period after the initial claim (the relapse rate), and

the complications related to sinusitis.

The study groups were fairly comparable in terms of gender and age. However, they differed significantly in relation to type of physician and symptomatic therapy. A stepwise logistic regression analysis was used to account for confounding factors.

Effectiveness results
The success rate was 90.1% for the 17,329 patients who received first-line antibiotics and 90.8% for the 11,773 patients who received a second-line antibiotic. The difference was 0.7% (95% confidence interval: 0.0 - 1.4; p<0.05).

The relapse rate was 3.3% for patients who received first-line antibiotics and 3.5% for those who received second-line antibiotics.

Only one patient in each group developed a complication of acute sinusitis in the 28-day follow-up period.

Clinical conclusions
Patients treated with a first-line antibiotic for acute uncomplicated sinusitis did not have clinically significant differences in outcomes from those treated with a second-line antibiotic.

Measure of benefits used in the economic analysis
There was no summary measure of benefit used in the economic analysis. A cost-consequences analysis was therefore conducted.

Direct costs
The direct costs seem to have been those of the health care provider. The costs for professional visits, tests, laboratory or pathology tests, medical or surgical interventions, prescriptions and the emergency department were included. All of these were related to the ICD-9 acute sinusitis code claim. Hospital charges were used instead of the actual costs. The average costs were reported. No price year was reported.

Statistical analysis of costs
A statistical analysis of the costs was not conducted.

Indirect Costs
None specified.
Currency
US dollars ($).

Sensitivity analysis
A sensitivity analysis was not conducted.

Estimated benefits used in the economic analysis
See the 'Effectiveness Results' section.

Cost results
The average, total direct charge was $68.98 for patients who received first-line antibiotics and $135.17 for those who received second-line therapy. The difference in charges was $66.19.

Synthesis of costs and benefits
Not applicable.

Authors’ conclusions
The patients treated with first-line antibiotics for acute uncomplicated sinusitis did not have clinically significant differences in outcomes from those treated with a second-line antibiotic. First-line antibiotics are substantially cheaper than second-line antibiotics. Consequently, physicians should avoid prescribing second-line antibiotics as the initial antibiotic treatment.

CRD COMMENTARY - Selection of comparators
The authors chose first-line antibiotics as their comparator since they used to be the antibiotics of choice. However, there were several types of antibiotics with different usage rates. Therefore, you should decide if that prescribing practice is applicable in your setting.

Validity of estimate of measure of effectiveness
This was a retrospective cohort study that used a database as the source of data. There was significant potential for selection bias and confounding with this study design. The authors reported that the accuracy of the diagnosis was not confirmed and it seems quite likely that other conditions, such as viral upper respiratory illness, were included in the study. It was also possible that the physicians prescribed the antibiotic type depending on the disease status. The authors tried to adjust for potential selection bias using a "propensity scores analysis". It was unclear if this was effective. The groups were not comparable at analysis in terms of a few important factors. However, the authors used a logistic regression analysis to adjust for those factors. There may have been other confounding factors.

Validity of estimate of measure of benefit
There was no summary measure of benefit.

Validity of estimate of costs
All of the categories of cost relevant to the provider's perspective were included in the analysis. All direct charges and utilisation related to the index episode of sinusitis and the 28-day follow-up pre-period were included in the analysis. This appears to have been appropriate for a provider's perspective. Charges were used, which may not reflect the real opportunity costs of resource utilisation. The quantities and the unit costs were not reported separately and no price year was reported. Both of these factors limit the generalisability of the results.
Other issues
The authors discussed the details of their study. They also made appropriate comparisons with other study results, but did not address the issue of generalisability of their results. The results do not appear to have been reported selectively. The authors' conclusions appear to reflect the scope of the analysis, although there is some doubt about the internal validity of the results.

Implications of the study
The authors state "there is a significant opportunity to improve patient care and decrease costs through more judicial use and selection of antibiotics".

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Other publications of related interest

Poole MD. A focus on acute sinusitis in adults: changes in disease management. American Journal of Medicine 1999;106:385-47S.


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