Evaluation of an antibiotic prescribing protocol for treatment of acute exacerbations of chronic obstructive airways disease in a hospital respiratory unit

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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
Use of antibiotics in the treatment of infective exacerbations of chronic obstructive airways disease (COAD). First line therapy was oral amoxycillin 500mg tid (or erythromycin 500mg qid if allergic) and oral ciprofloxacin 500mg bd as second line treatment.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
Patients with a discharge diagnosis of infective exacerbation of chronic obstructive airways disease (COAD). The patients in the two groups were around 60 years old.

Setting
The clinical and economic studies were set in a regional respiratory unit at a hospital in Dundee, UK.

Dates to which data relate
The effectiveness analysis related to data collected in 1990 and 1991. The economic analysis also related to data collected in 1990 and 1991, together with a separate comparison of the mean costs per defined daily dose (DDD) of all antibiotics for 1991 and 1992.

Source of effectiveness data
Evidence for final outcomes was derived from a single study.

Link between effectiveness and cost data
Both costing and effectiveness data were collected retrospectively from the same patient sample.

Study sample
No mention was made of adequate sample size or power calculations. Patients were recruited into the study on admission to a central clearing ward within the respiratory unit. Every third admission from the first of November of two sequential years was screened as a potential participant. 140 patients were screened, but only 86 were studied. Any patient with a discharge diagnosis other than infective exacerbation of COAD was excluded.
Study design
Non-randomised trial with historical control at a single centre. The duration of follow-up was restricted to length of hospital stay, the maximum period being 25 days. Of the original 140 patients screened, 86 were studied: 44 in the pre-protocol group and 42 in the post-protocol group.

Analysis of effectiveness
The analysis seems to have been based on intention to treat. The primary health outcome was response to first line therapy. The groups were matched in terms of age, sex, and prior treatment from GP, but differed with respect to severity score.

Effectiveness results
The response to first line therapy was 68% for 1990 and 67% for 1991. Of those who had received antibiotics from their GP, 67% responded to first line therapy, while, of those who had not received antibiotics from their GP, 75% responded. The duration of therapy was shorter in first line responders (mean 7.3 days (95% CI: 6.3 - 8.3 days) versus mean 12.7 days (95% CI: 10.1 - 15.3 days), (p<0.05).

Clinical conclusions
The introduction of antibiotic prescribing guidelines for treatment of infective exacerbations of COAD showed no detrimental effect on outcome measures. However, the overall clinical response rate to first line therapy (67%) left considerable scope for improvement.

Measure of benefits used in the economic analysis
Since the clinical analysis did not show a statistically significant difference in outcomes, the economic analysis was based on cost differences only.

Direct costs
The impact on direct costs was calculated in two ways: firstly, costs of antibiotics were based on the actual price paid for the drugs by the hospital pharmacy. Secondly, the total cost of all antibiotics prescribed in the unit was calculated by obtaining pharmacy supply records. Costs and quantities were analysed separately. The quantities measured included length of treatment and length of stay. The costs were those for treatment with antibiotics, from the viewpoint of the hospital. The estimation of both quantities and costs was based on actual data. Costs and quantities for the study were measured in 1990 and 1991.

Statistical analysis of costs
Students t test for unpaired data was used to compare length of stay and antibiotic costs.

Currency
UK pounds sterling ()

Sensitivity analysis
Not carried out.

Estimated benefits used in the economic analysis
Not applicable.
Cost results
After the introduction of the prescribing protocol, the mean cost per day for antibiotic treatment (measured as average cost per DDD) was reduced by 54.6% (95% CI: 52.3-56.9%) from 3.77 to 1.71. The median cost per day of antibiotic treatment was reduced from 0.42 to 0.26 (95% CI of difference, 0.06-0.21; p<0.05). The median cost of antibiotics per patient treated was reduced from 3.30 to 1.75 (95% CI of difference, 0.01-1.87; p<0.05).

Synthesis of costs and benefits
Not applicable.

Authors' conclusions
The introduction of antibiotic prescribing guidelines for treatment of infective exacerbations of COAD showed no detrimental effect on outcome measures, but was associated with a significant reduction in the cost of antibiotic therapy. However, the overall clinical response rate to first line therapy (67%) left considerable scope for improvement. Given the association between non-response and length of stay, drugs such as ciprofloxacin might prove to be more cost effective than amoxycillin. The audit established in this study provides a system for evaluating future proposed changes to the antibiotic guidelines. The next logical step would be a prospective, double-blind comparison of amoxycillin with ciprofloxacin, the current second line treatment.

CRD Commentary
The study is a useful addition to the literature on the benefits or otherwise of prescribing guidelines. However, the design of the study leaves the results open to a number of potential biases. Also, there was no mention of the adequacy of sample size in answering the questions posed in the study. A lack of clarity in presenting the clinical analysis makes the interpretation of the overall study quite difficult. A sensitivity analysis would have improved the validity of the study findings. The setting is within the UK and so has relevance to the NHS, but there is not discussion of how generalisable the results might be. However, with the data sources being fairly standard, external validity should be relatively high.

Implications of the study
There is a wealth of articles on the subject of audit and guidelines in prescribing, many of which support the positive findings from this study. However, as the authors themselves pointed out, more research, using a more robust study design, is required to determine the most effective form of antibiotic treatment for this condition. The audit established in this study could provide the framework for evaluating such a proposal.

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