Medical outcomes and antimicrobial costs with the use of the American Thoracic Society guidelines for outpatients with community-acquired pneumonia


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

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis and cost-utility analysis.

Study population
Adult outpatients (18 years of age or older) with community-acquired pneumonia.

Setting
Hospital. The economic study was carried out in Halifax, Nova Scotia, Canada and Pittsburgh, PA, and Boston, Mass., USA.

Dates to which data relate
The dates corresponding to the resource use and effectiveness data were October 1991 to March 1994. The price year was 1993.

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

Link between effectiveness and cost data
The costing was undertaken prospectively on the same patient sample as that used in the effectiveness analysis.

Study sample
No power calculations were reported. A total of 864 patients was included in the study. Eighty patients originally enrolled were subsequently excluded from the study (8.5%). In the category of young patients without comorbid illnesses, 339 patients were considered to be in the intervention group (therapy consistent with the ATS guidelines), whereas 207 patients were in the control group (therapy not consistent with the ATS guidelines). In the older age group (aged over 60 years and/or with at least one comorbid illness), 56 patients underwent treatment with the intervention, and 262 patients received the comparator strategy.
Study design
This was a prospective cohort study carried out in 5 centres in 3 geographic locations. The duration of follow-up was 30 days. No loss to follow up was reported.

Analysis of effectiveness
The analysis was based on the 'intention to treat' principle. The primary health outcomes used in the analysis were time elapsed before return to work for those employed at baseline, mortality, medical complications, resolution of symptoms, and health-related quality of life. These outcomes were measured by means of direct interviews and direct clinical observation at 30 days for the relevant cases. Health-related quality of life was measured by means of a Medical Outcomes Study Short Form 36 (SF-36) which was applied to a subset of patients primarily defined as having short-term 'low-risk' mortality and enrolled in the first 20 months. Odds ratios (OR) were reported as the ratio of intervention to the comparator values. For the 'young adult without comorbidity' patient sub-population, the groups were not comparable in terms of age and treatment with antimicrobials during the 7-day period before presentation with CAP. For the older and/or comorbid patient sub-population, the ATS consistently-treated group was associated with more comorbid illnesses, while no other significant differences were found in terms of demographic characteristics, individual comorbid illnesses, symptoms, or severity of illness. A multivariate regression analysis was used to control for the differences in variables at baseline. The survival rate at thirty days was 100% for the young patient without comorbidity category. In this same category, the associated median length of time period elapsed before returning to work was 7 days for the intervention group, and 8 days for the comparator, (p=0.04). The odds ratio (OR) of subsequent hospitalisation was 0.7, (95% CI: 0.3 - 1.5); the OR for the pneumonia-related subsequent hospitalisation was 0.6, (95% CI: 0.1 - 1.7); the OR for rash was 1.0, (95% CI: 0.2 - 5.2); the OR of nausea, diarrhoea, or vomiting was 0.9, (95% CI: 0.5 - 1.7).

Effectiveness results
The SF-36 mental health score had a mean of 52.2 for the intervention and 51.5 for the comparator, (p=0.57). The SF-36 physical health score had a mean value of 51.8 for the intervention group and 50.5 for the comparator, (p=0.33). For the old and/or comorbid patient category, the mortality rate was 5.4 in the intervention group and 0.8 in the comparator (OR 6.1, 95% CI: 0.9 - 53.6; p=0.6); the median time elapsed before returning to work was 7 days for both groups; OR for subsequent hospitalisations was 2.2, (95% CI: 0.9 - 5.0); pneumonia-related subsequent hospitalisation had an OR of 0.9, (95% CI: 0.2 - 3.1); rash had an OR of 0.5, (95% CI: 0.0 - 3.1); the OR for nausea, vomiting, or diarrhoea was 1.8, (95% CI: 0.6 - 4.5).

The SF-36 mean mental health score for the intervention group was 51.6, whereas the corresponding figure for the comparator was 51.7, (p=0.98). The SF-36 mean physical health score was 42.5 for the intervention, whereas it was 45.2 for the comparator. After adjusting for clinical site of care and baseline differences in the number of comorbid illnesses in the older age and/or comorbid category, and for site of care, patient age, previous antimicrobial use, and risk class for the younger and no comorbid illness category, no differences in outcomes remained.

Clinical conclusions
This study, which demonstrated a pneumonia cause in only 5.4% of outpatients, supports the ATS guideline premise that virtually all antimicrobial therapy for outpatients with CAP is prescribed empirically. In contrast, given the large proportion of patients in (the) study cohort with an undetermined microbiological cause, the present study does not support the premise that the spectrum of causative agents for outpatients with CAP differ by age and comorbid illness.

Measure of benefits used in the economic analysis
No summary benefit measure was identified in the economic analysis, and only separate clinical and health-related outcomes were reported.

Direct costs
Costs were not required to be discounted due to the short time frame of the study. The quantities of resource use were
not reported separately from the prices. The costs of all antimicrobials administered to the patient were calculated for the 30-day period following presentation with CAP. These costs included parenteral and oral antimicrobial agents prescribed during hospitalisation and on hospital discharge for hospitalised patients. The perspective adopted in the cost analysis was not explicitly specified. The estimation was based on actual data collected for the period October 1991 to March 1994. The unit costs of the antimicrobial agents were estimated using the published average wholesale price of the least expensive generic equivalent from the 1993 drug Red Book.

**Statistical analysis of costs**

The total costs per patient were reported as medians, both for the total figures per patient and the average daily cost per patient. Student's t test was used to compare the groups in terms of costs. A multivariate regression analysis was used to control for the effects of differences in variables at baseline on cost differences between the groups.

**Indirect Costs**

Not considered.

**Currency**

US dollars ($).

**Sensitivity analysis**

Not conducted.

**Estimated benefits used in the economic analysis**

Not applicable.

**Cost results**

For the category of 'young patient without comorbidity' the total median cost per patient was $5.43 for the intervention, and $18.51 for the comparator, (p<0.001). The median average daily cost figures were $0.34 and $1.31, for the intervention and the comparator, respectively, (p<0.001). For the category of 'old and/or comorbid patient', the median total cost per patient figures were $73.50 for the intervention and $7.50 for the comparator, (p<0.001). The median average daily cost per patient figures in this category were $5.45 (intervention) and $0.62 (comparator), (p<0.001).

**Synthesis of costs and benefits**

Not performed.

**Authors' conclusions**

The study supports the use of erythromycin as recommended by the ATS guidelines for outpatients aged 60 years or younger with no comorbidity. Although the recommended antimicrobial therapy for outpatients aged over 60 years or with 1 or more comorbidity is more costly, this observational study provides no evidence of improved medical outcomes in the small subgroup who received ATS guideline-recommended therapy.

**CRD COMMENTARY - Selection of comparators**

The reason for the choice of the comparator is clear.

**Validity of estimate of measure of benefit**

The internal validity of the study results may be weakened by the observational study design used in the study. Since no summary benefit measure was identified in the economic analysis, the study should be regarded as a cost-consequences
study.

**Validity of estimate of costs**
The resource quantities were not reported separately from the prices and few details of methods of cost estimation were given, since the cost analysis was restricted to the cost of antibacterials administered.

**Other issues**
The conclusions reached by the authors need to be treated with some caution, due to the lack of a comprehensive sensitivity analysis. The generalisability of the study was limited, since the study was carried out in the Northeast region of the USA, where the authors noted that the majority of the population is white. This was reported to be the first study which attempted to validate the recommendations given in the ATS guidelines. The results were not presented selectively.

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