Pharmacoeconomics of aztreonam-clindamycin versus gentamicin-clindamycin in the treatment of penetrating abdominal injury

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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
Aztreonam-clindamycin (A-C) versus gentamicin-clindamycin (G-C) in the treatment of penetrating abdominal injury.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
Adult patients with suspected penetrating intraabdominal injury requiring laparotomy. The patient was excluded if at least one of the following conditions applied: history of immediate hypersensitivity to aztreonam, gentamicin, clindamycin, cephalosporins, or penicillin; history of pseudomembranous colitis; pregnancy or lactation; systolic blood pressure < 80 mmHg after fluid replacement; renal dysfunction requiring haemodialysis or peritoneal dialysis; neutrophil count < 1000 cells per mm3; "severe underlying disease that might interfere with the evaluation of the therapeutic response"; expected survival < 48 hours; receipt of systemic antimicrobials other than the study agents; and irrigation of the abdominal cavity with antimicrobial solution.

Setting
Referral hospital with level 1 trauma centre, Memphis, USA.

Dates to which data relate
Effectiveness data were collected between August 1991 and April 1992. Dates of collection of the costing data were not explicitly stated. The price year was not stated.

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

Link between effectiveness and cost data
Costing was undertaken retrospectively on the same patient sample as that used in the effectiveness analysis.

Study sample
Ninety-six (96) patients were enrolled in the pharmacoeconomic study. Of these, 49 were randomised to receive A-C and 47 to receive G-C. 8 patients were excluded from the study due to failure to meet the entry criteria. Another 3 patients were excluded because of incomplete or missing hospital charge data. The exclusions left a final sample of 85
patients. The sample size was determined using power calculations.

**Study design**
The study was a pharmaco-economic analysis performed at one of the sites participating in the prospective, randomised, double-blind, comparative, multicentre efficacy study. The patients were randomised using computer-generated lists. Those patients were followed-up until hospital discharge (mean 7.6 days in A-C, and 9.0 days in the G-C).

**Analysis of effectiveness**
The analysis of effectiveness was based on treatment completers only. The main health outcome used in the analysis was the infection rate or clinical response (wound infection, intraabdominal infection and necrotising fasciitis of the abdominal wall were considered antibiotic failures). An Acute Physiology and Chronic Health Evaluation II (APACHE II) score was calculated for both groups. Only age was significantly different between the groups (p<0.05), with patients in the A-C group being slightly older than patients receiving G-C.

**Effectiveness results**
Overall, 43 (97%) of 44 patients receiving A-C had a favourable clinical response compared with 35 (85.4%) of 41 receiving G-C (p=0.052).

**Clinical conclusions**
A-C patients had a better clinical response than the G-C group, although this did not reach statistical significance.

**Measure of benefits used in the economic analysis**
The main health outcome used in the analysis was the infection rate or clinical response (wound infection, intraabdominal infection and necrotising fasciitis of the abdominal wall were considered antibiotic failures).

**Direct costs**
Direct health service costs were considered: intensive care unit (ICU) hospital bed, non-ICU bed, nursing, operating room, laboratory, pharmacy, diagnostic, inpatient services, medical supplies, emergency room. Costs were calculated from charge data from the hospital billing system by converting the latter using an institutional cost to charge ratio. The study drug and aminoglycoside monitoring costs were estimated using average wholesale prices and standard fees, respectively. The price year was not stated, and physician fees were omitted from the analysis.

**Statistical analysis of costs**
Cost data for antibiotics regimens were analysed using three statistical techniques: Student's t test, Wilcoxon rank sum test, and a means test combination with the bootstrap method. Chi2 statistic and Fisher's exact test were also used.

**Currency**
US dollars ($).

**Sensitivity analysis**
No sensitivity analysis was performed.

**Estimated benefits used in the economic analysis**
Overall, 43 (97%) of 44 patients receiving A-C had a favourable clinical response compared with 35 (85.4%) of 41
receiving G-C (p=0.052).

Cost results
Mean hospital costs were $12,058 for A-C and $13,742 for the G-C group (p>0.05). Mean pharmacy costs, in turn, were $1,411 and $1,604 (p>0.05).

Synthesis of costs and benefits
Costs and benefits were not combined since the A-C option turned out to be the dominant strategy.

Authors' conclusions
The results indicate that treatment costs for patients with penetrating abdominal trauma receiving A-C versus G-C are not significantly different from the perspectives of both the hospital and pharmacy directors. The trend for a lower infection rate in patients receiving A-C could result in substantial institutional savings, considering the 5-fold mean increase in costs between infected and noninfected patients. Nonetheless, a larger study with greater statistical power or, alternatively, development of an appropriate probability pathway model is required to validate this supposition.

CRD COMMENTARY - Selection of comparators
The reason for the choice of comparators is clear, as they were widely used antibiotic treatments in the author's setting. You, as a database user, should consider whether they are widely used health technologies in your own setting.

Validity of estimate of measure of benefit
Data do not appear to have been used selectively to prove a particular point. However, the study was based on the treatment completers principle, which might lead to bias in the study results.

Validity of estimate of costs
Resource use quantities were not reported separately from costs. Adequate details of the methods of quantity/cost estimation were given and no important cost items were omitted with the possible exception of physician fees.

Other issues
The issue of the generalisability of cost results to other countries was not addressed.

Implications of the study
As the authors recognized, a further larger study is desirable in order to validate the findings of this study.

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