Pharmacoeconomic benefit of antibiotic step-down therapy: converting patients from intravenous ceftriaxone to oral cefpodoxime proxetil

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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

Antibiotic step-down therapy from intravenous ceftriaxone to oral cefpodoxime proxetil in patients with community-acquired pneumonia or a complicated urinary tract infection.

Type of intervention

Treatment.

Economic study type

Cost-effectiveness analysis.

Study population

Patients receiving intravenous ceftriaxone for either community-acquired pneumonia or a complicated urinary tract infection. The age range was 48 - 76 years, with a mean age of 67 in the intervention group and 66 in the control group.

Setting

Institution. The Veterans' Affairs Medical Centre, Denver, USA.

Dates to which data relate

The publication year of the paper was 1995. Data were collected over a 3 month period. Dates for prices were not given.

Source of effectiveness data

Clinical notes from a single study.

Link between effectiveness and cost data

Costing was undertaken on the same patient sample as that used for effectiveness. Costing appears to have been undertaken retrospectively, but this was not explicitly stated.

Study sample

Selection of subjects was based on clinician assessment of suitability for the trial.67 patients were screened as potential candidates from which the final 40 (20 control, 20 intervention) were selected. 27 (40%) were excluded because they were not suffering from pneumonia or an UTI, or were not thought to besuitable for oral therapy. There is no evidence of power calculation having been used to determine sample size. The number of subjects refusing enrolment was not given.

Study design
This was a single centre, unblinded non-randomised trial with concurrent controls. Follow up was for one month after discharge from hospital

Analysis of effectiveness
The analysis of the clinical study was based on intention to treat. The primary health outcomes were measured in terms of duration of therapy for intravenous ceftriaxone, and for oral antibiotic therapy, in addition to length of stay in hospital. The intervention and control groups were shown to be well matched.

Effectiveness results
Patients were monitored closely for adverse effects and none were found. Patients with pneumonia whose therapy was converted to oral cefpodoxime averaged 1.9 fewer days of intravenous ceftriaxone and received 0.8 fewer days of oral antibiotic therapy following their conversion from intravenous therapy, than the control group. The average total duration of antibiotic therapy for patients with pneumonia was 9.3 and 12 days for the cefpodoxime and control groups respectively. Length of stay in hospital was 1.2 fewer days for the cefpodoxime treated group compared to the control group. In patients with UTI the cefpodoxime group averaged 0.6 fewer days of intravenous ceftriaxone and 2.6 fewer days of oral antibiotic therapy following conversion. Total duration of antibiotic therapy averaged 3.2 fewer days and the average length of stay in hospital was 0.5 fewer days for the cefpodoxime group.

Clinical conclusions
Physicians at the study centre eventually do use oral agents to complete an extended course of antibiotic therapy. Pharmacy service intervention facilitates the change earlier in the treatment course.

Measure of benefits used in the economic analysis
The measure of benefits was the saving of resources in terms of duration of therapy and length ofstay in hospital

Direct costs
Quantities and costs were not reported separately. Considering the short time frame, costs were, appropriately, not discounted. Hospital direct costs included were drug acquisition costs, hospital stay, pharmacy preparation and delivery costs, nursing administration time, and auxiliary charges (tubing and needles). Estimation of quantities was based on actual data recorded from patient records. Estimation of costs appears to be based on actual drug acquisition costs and the average daily cost of an admission to the study centre, non diagnosis-specific. The source of quantity data appears to be direct observation. The source of cost data appears to be the study centre. Quantities of resources were measured at the time of the trial but the date was not reported. Costs were reported as average daily cost per patient, and incremental cost per patient was calculated but termed 'savings'

Statistical analysis of costs
Costs were treated in a stochastic way, in that averages are reported. However, statistical analysis was not attempted due to the small numbers.

Currency
US dollars ($).

Sensitivity analysis
No sensitivity analysis was performed.

Estimated benefits used in the economic analysis
Total duration of antibiotic therapy averaged 3.2 fewer days and the average length of stay in hospital was 0.5 fewer days for the cefpodoxime (intervention) group. Patients were monitored for side effects for one month following discharge from the study hospital and none were reported. The post-discharge follow-up period revealed no readmissions and no evidence of recurrence of the primary infection Incremental benefits were calculated in terms of resources saved.

Cost results
A comparison was made between the drug acquisition and administration costs, plus the length of stay as an in-patient for routine therapy compared to pharmacist-directed step-down therapy. The results show a saving of resources in terms of drug costs and hospital stay in the latter group. The total cost for the intervention group was $3,040.26 for 20 patients, the total cost for the control group being $3,961.26 for 20 patients. The incremental cost was -$46.05 per patient for the intervention. The above figures did not include the hospital bed costs although these were reported separately. Costs of adverse effects were not included as there were none.

Synthesis of costs and benefits
No synthesis was undertaken by the authors as the intervention was dominant. Incremental costs were negative and incremental benefits were positive.

Authors' conclusions
Pharmacy service intervention appeared to facilitate the early use of intravenous-to-oral step-down therapy. The use of pharmacy directed cefpodoxime step-down therapy in this group of patients resulted in a cost saving of $46.05 per patient at the time of the study in drug costs alone. Pharmacy departments should investigate the opportunities provided by step-down programmes to reduce costs of antimicrobials without compromising patient care.

CRD Commentary
It may have been better to include the savings in terms of length of stay, and daily cost of an admission in the final analysis, rather than leaving them separate. The numbers included in the study were small and no reason was given for not increasing the numbers. The dates during which the study was carried out should have been reported and their omission makes it difficult to use the data in another setting. Although the authors stated that drug costs included pharmacy services and drug delivery costs, no details of these costs were provided.

Implications of the study
A pharmacist intervention programme to promote early step-down therapy in suitable patient groups can result in cost savings due to reduced duration of therapy and reduced length of stay as an in-patient.

Source of funding
None stated.

Bibliographic details
Hendrickson J R, North D S. Pharmacoeconomic benefit of antibiotic step-down therapy: converting patients from intravenous ceftriaxone to oral cefpodoxime proxetil. Annals of Pharmacotherapy 1995; 29(6): 561-565

PubMedID
7663025

Indexing Status
Subject indexing assigned by NLM

MeSH
Administration, Oral; Aged; Bacterial Infections /drug therapy; Ceftizoxime /administration & dosage /analogs & derivatives /economics /therapeutic use; Ceftriaxone /administration & dosage /economics /therapeutic use; Colorado; Community-Acquired Infections /drug therapy; Costs and Cost Analysis; Drug Costs; Female; Hospital Bed Capacity, 300 to 499; Hospitals, Veterans; Humans; Injections, Intravenous /economics; Male; Middle Aged; Pharmacy Service, Hospital /economics; Pneumonia /drug therapy; Prodrugs /administration & dosage /economics /therapeutic use; Urinary Tract Infections /drug therapy

AccessionNumber
21995000776

Date bibliographic record published
31/07/1999

Date abstract record published
31/07/1999