Impact of regular attendance by infectious disease specialists on the management of hospitalised adults with community-acquired febrile syndromes


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 an infectious disease specialist (IDS) for the management of hospitalised adults with community-acquired infection.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised adults patients hospitalised as a result of community-acquired febrile syndromes. The patients were required to need intravenous antibiotic therapy for at least 24 hours.

Setting
The setting was a hospital. The economic study was carried out in Israel.

Dates to which data relate
The effectiveness and resource use data were gathered from January to April 1999. The price year was not explicitly reported.

Source of effectiveness data
The effectiveness evidence was derived from a single study.

Link between effectiveness and cost data
The costing was carried out prospectively on the same sample of patients as that used in the effectiveness study.

Study sample
Power calculations were not carried out. Consecutive eligible patients were admitted from the emergency room and allocated to the two study groups. Overall, 402 patients were identified and included in the analysis. There were 160 patients in ward 1, where all senior physicians were IDS, and 242 patients in ward 2, where all physicians belonged to other sub-specialties. The mean age of the patients was 64.7 (+/- 19) years (median 69; age range: 19 - 97) in ward 1 and 67.3 (+/- 19.6) years (median 72; age range: 17 - 99) in ward 2. The proportion of male patients was 48.5%.
Study design
This was a prospective, randomised clinical trial that was carried out at a single centre, the Soroka University Medical Center in Negev, a southern region of Israel. A secretary allocated the patients without considering demographic or clinical parameters, with the wards taking turns in a cyclic fashion (i.e. every 6 consecutively admitted patients were allocated to the six internal medicine wards according to the order in which they arrived and were treated in the emergency department). The authors stated that both groups of wards were comparable in terms of organisational aspects, with the exception of mechanical ventilation, which was offered only in ward 1. One of the investigators evaluated the antibiotic therapy administered to each patient in a blinded fashion. The patients were followed until hospital discharge. No patient appears to have been lost to the follow-up assessment.

Analysis of effectiveness
The analysis of the clinical study appears to have been conducted on an intention to treat basis. The outcome measures used were:

- the length of stay (LOS);
- the mortality rates;
- admission and discharge diagnoses;
- the use of diagnostic tests including urinalysis, chest radiograph, blood culture, urine culture, and complete blood count;
- the duration and use of antibiotics; and
- the appropriateness of therapy, which was assessed according to current literature and international guidelines.

The study groups were comparable in terms of the demographic and clinical characteristics.

Effectiveness results
The mean LOS was 6.4 (+/- 5.9) days (median 5; range: 1 - 45) in ward 1 and 5.2 (+/- 4.1) days (median 4; range: 1 - 30). The difference was statistically significant, (p<0.01).

Crude mortality rates were 6.3% in ward 1 versus 7.9% in ward 2, (p=not significant).

For diagnosis on admission, the patients were more likely to have been classified as having pneumonia in ward 1 than in ward 2 (30% versus 21%; p=0.01), while fever of unknown origin was defined in 34% (ward 1) versus 48% (ward 2) of patients, (p<0.02).

At discharge, there was more uncertainty in the diagnosis in ward 1 than in ward 2 (rate of fever of unknown origin in 24% versus 36%; p=0.005). Further, ward 1 patients were significantly more likely to be classified as having a urinary tract infection than ward 2 patients (23% versus 11%; p=0.002) and less likely to be considered as having an upper respiratory tract infection (0% versus 7%; p<0.001).

Diagnostic test usage in ward 1 patients versus ward 2 patients was as follows:

- urinalysis was performed in 90% versus 67%, (p<0.001);
- chest radiographs were performed in 96% versus 92%, (p=0.02);
- blood culture was performed in 92% versus 72%, (p<0.001);
- urine culture was performed in 92% versus 49%, (p<0.001);
- complete blood count was performed in 95% in both groups (p non significant); and
overall, the five diagnostic tests were performed in 82.5% versus 39% of patients, (p<0.001).

The rates of combination therapy and monotherapy were comparable between the groups. The mean duration of antibiotic therapy was 3.6 (+/- 1.5) days (median 3 days; range: 1 - 10) in ward 1 and 3.2 (+/- 1.5) days (median 3; range: 1 - 10) in ward 2, (p non significant). The use of restricted agents was 32% in ward 1 versus 20% in ward 2, (p<0.001). Empirical antibiotic therapy was guided by symptoms in 34% (ward 1) versus 54% (ward 2) of patients, and by anatomy in 66% (ward 1) versus 46% (ward 2) of patients, (p<0.01).

The patients in ward 1 were significantly more likely to receive appropriate therapy than patients in ward 2 (55.5% versus 43%; p=0.012). An alternative agent should have been given for clinical or economic reasons in 36% (ward 1) and 45% (ward 2) of patients, (p=0.06), and for pharmacological reasons in 6.2% (ward 1) versus 8.3% (ward 2) of patients, (p=0.28). No antibiotic therapy was indicated for 1.1% of ward 1 patients versus 3.3% of ward 2 patients, (p=0.16).

Clinical conclusions
The effectiveness analysis showed that the attendance of an IDS led to more appropriate antibiotic usage than non-specialist attendance. However, significantly higher rates of diagnostic tests and restricted agents were observed in IDS-treated patients.

Measure of benefits used in the economic analysis
The health outcomes were left disaggregated and no summary benefit measure was used in the economic analysis. In effect, a cost-consequences analysis was carried out.

Direct costs
Discounting was not relevant since the costs per patient were incurred during a short timeframe. The unit costs were not presented separately from the quantities of resources used. Only the costs of antibiotic therapy were considered in the analysis. The costs of vial preparation and personnel costs were not considered. The cost/resource boundary of the hospital appears to have been adopted. The estimation of resource use was presumably based on the quantities of antibiotics used in the sample of patients included in the clinical trial. The source of the costs was not explicitly reported, but it could have been the final department of the study hospital. The price year was not reported.

Statistical analysis of costs
The costs were treated deterministically.

Indirect Costs
The indirect costs were not considered in the economic evaluation.

Currency
US dollars ($).

Sensitivity analysis
Sensitivity analyses were not carried out.

Estimated benefits used in the economic analysis
See the 'Effectiveness Results' section.
Cost results
The overall cost of treatment was $15,760 in ward 1 and $20,456 in ward 2.

The mean costs per patient/antibiotic day were $24.7 in ward 1 and $26.4 in ward 2.

Cefuroxime and amoxycillin-clavulanate represented 56% and 54%, respectively, of drug courses in the case of unrestricted drugs. The corresponding costs of therapy were $2,846 for cefuroxime ($1,865 in ward 1 and $1,599 in ward 2) and $6,027 for amoxycillin-clavulanate ($981 in ward 1 and $4,428 in ward 2).

Synthesis of costs and benefits
A synthesis of the costs and benefits was not relevant since a cost-consequences analysis was carried out.

Authors' conclusions
In comparison with patients being attended by physicians from other specialties, the attendance of an infectious disease specialist (IDS) led to more accurate diagnosis and therapy for the management of community-acquired infections. IDSs prescribed more restricted (and expensive) agents, but the overall medication costs were offset by the use of less expensive agents among unrestricted drugs.

CRD COMMENTARY - Selection of comparators
The selection of the comparator reflects the current practice for patient attendance in the setting of internal medicine at the authors’ institution. The authors discussed the organisational contexts where IDS attendance took place. You should decide whether this is a valid comparator in your own setting.

Validity of estimate of measure of effectiveness
The effectiveness evidence came from a clinical trial that was appropriate for the study question. The study groups were comparable at baseline, which enhanced the robustness of the comparison. The authors stated that the two groups of wards were comparable in terms of most organisational aspects. This reduces the potential impact of confounding factors and selection bias. Only one of the outcome measures was evaluated in a blinded fashion. The methods of randomisation and sample selection were described. The length of follow-up was short but appropriate, as relevant outcomes were observed during the initial hospital stay. No justification for the choice of the sample size was provided. Moreover, since the patients were recruited from a single institution, the study sample could not be fully representative of the patient population. In fact, a variety of antibiotic treatments were administered and different diagnostic categories were considered. These issues could limit the internal validity of the analysis.

Validity of estimate of measure of benefit
No summary benefit measure was used in the analysis because a cost-consequences analysis was conducted. Please refer to the comments in the 'Validity of estimate of measure of effectiveness' field (above).

Validity of estimate of costs
The authors did not report explicitly the perspective adopted in the study. Only those costs strictly related to antibiotic therapy were considered; administration and preparation costs were excluded. The unit costs were not reported and drug usage was derived from the sample of patients included in the effectiveness study. The source of the costs was unclear. The price year was not given but the costs were presumably gathered in 1999. Overall, the cost analysis represented a minor objective of the study.

Other issues
The authors reported the conclusions reached in other studies that evaluated the impact of IDS attendance on the accuracy of diagnosis and treatment. In general, improved outcomes were observed in IDS-managed patients. The issue
of generalisability of the study results to other settings was not addressed, which limits the external validity of the analysis. The authors noted some limitations of their study. First, changes from intravenous to oral administration of antibiotic treatments were not investigated. Second, physicians in ward 2 might have delivered a more appropriate treatment to patients with diseases other than infections because of the different composition of attending physicians. Third, the approach used to evaluate treatment appropriateness was highly subjective although it reflected standard guidelines and recommendations.

**Implications of the study**
The study results supported the implementation of IDS attendance for hospitalised patients with community-acquired infections. The authors stated that further research should investigate the impact of IDSs on mortality rates in studies with an adequate sample size.

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