Implementing antibiotic practice guidelines through computer-assisted decision support: clinical and financial outcomes

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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
The implementation of antibiotic practice guidelines, through computer-assisted decision support.

Type of intervention

Economic study type
Cost-effectiveness analysis

Study population
Patients discharged from a acute-care referral hospital.

Setting
Hospital. The economic study was carried out in Utah, USA.

Dates to which data relate
Effectiveness and resource data was collected over the period 1988-1994. 1988 prices were used.

Source of effectiveness data
Single study.

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

Study sample
Out of 162,196 patients discharged from hospital, 63,759 patients were included in the study since they received antibiotics.

Study design
Case series. Outcomes were compared over the time during which the intervention was implemented. It was a single centre study.

Analysis of effectiveness
The clinical study appeared to be based on intention to treat. The primary clinical outcomes were: measures of antibiotic use, rates of adverse effects, mortality, patterns of anti-microbial response.

**Effectiveness results**
39.3% of patients received antibiotics over the 7 year study period. The proportion of patients who received antibiotics increased annually, from 31.8% in 1988 to 53.1% in 1994. Patients who received their first prophylactic antibiotic dose within 2 hours prior to surgery rose from 40% in 1985 to 99.1% in 1994. The average number of prophylactic doses given per patient fell from 19 in 1985 to 5.3 in 1994. The number of alerts, generated by decision-support programs that manage information on the therapeutic use of antibiotics, decreased from an average 2.67 alerts per day in 1986 to 1.32 in 1994. Simultaneously the proportion of cases in which prescribing physicians changed the therapy on the basis of information increased from 30% to 99.9%. Adverse effects fell from 26.9% in 1989 to 18.8% in 1994. Mortality fell from 3.65% in 1988 to 2.65% in 1994 (p <0.001). Antimicrobial resistance patterns remained stable.

**Clinical conclusions**
Computer-assisted decision support programs that use clinician-derived practice guidelines can improve antibiotic use and stabilize the emergence of antibiotic-resistant pathogens.

**Measure of benefits used in the economic analysis**
The primary clinical outcomes were: measures of antibiotic use, rates of adverse effects, mortality, patterns of anti-microbial response.

**Direct costs**
Costs were not discounted. Health service costs were considered. Costs and quantities were not analysed separately. The total pharmacy drug expenditure and the acquisition price of antibiotics were calculated. The health service quantities measured were: number of patients treated, total milligrams administered and total doses administered. The costs were adjusted to 1988 prices, by using the prescription drug component of the Consumer Price Index. The data was derived from longitudinal electronic medical records of the hospital.

**Currency**
US dollars ($).

**Sensitivity analysis**
Not sensitivity analysis was carried out.

**Estimated benefits used in the economic analysis**
39.3% of patients received antibiotics over the 7 year study period. The proportion of patients who received antibiotics increased annually, from 31.8% in 1988 to 53.1% in 1994. Patients who received their first prophylactic antibiotic dose within 2 hours prior to surgery rose from 40% in 1985 to 99.1% in 1994. The average number of prophylactic doses given per patient fell from 19 in 1985 to 5.3 in 1994. The number of alerts, generated by decision-support programs that manage information on the therapeutic use of antibiotics, decreased from an average 2.67 alerts per day in 1986 to 1.32 in 1994. Simultaneously the proportion of cases in which prescribing physicians changed the therapy on the basis of information increased from 30% to 99.9%. Adverse effects fell from 26.9% in 1989 to 18.8% in 1994. Mortality fell from 3.65% in 1988 to 2.65% in 1994 (p <0.001).

**Cost results**
Between 1988 and 1994 the proportion of total pharmacy drug expenditures accounted for by antibiotics fell from 24.8% ($987,547) to 12.9% ($612,500). The antibiotic costs per treated patient fell from $122.66 in 1988 to $51.9 in
Synthesis of costs and benefits
The implementation of antibiotic practice guidelines is a dominant strategy.

Authors' conclusions
"Computer-assisted decision support programmes that use local clinician-derived practice guidelines can improve antibiotic use, reduce associated costs, and stabilize the emergence of antibiotic-resistant pathogens".

CRD Commentary
(1) This was not a randomized controlled trial. The authors noted that the results of the study could, therefore, be due to other interventions and institutional changes.

(2) The analysis related to only one hospital and was, therefore, not generalisable to other centres.

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