Clinical and economic effects of pharmacy services in a geriatric ambulatory clinic
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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 provision of a clinical pharmacy service in a geriatric primary care clinic was studied.

Type of intervention
Primary prevention.

Economic study type
Cost-effectiveness analysis.

Study population
The patient population comprised men attending a Veterans Affairs Medical Centre in the USA. No detailed characteristics of the population were provided.

Setting
The setting was primary care. The economic study was carried out in the USA.

Dates to which data relate
The study took place over 8 months from early 1998. This was the time period during which the effectiveness and resource evidence were collected. The dates for the prices used were not specified, but could be assumed to relate to the same period.

Source of effectiveness data
The effectiveness data came from a single study.

Link between effectiveness and cost data
The costing data came from the same patient sample as that used in the effectiveness analysis.

Study sample
A power calculation was conducted to determine the sample size. The sample population comprised patients attending the clinic over a 2-month period. Patients for the intervention group were selected if they were taking 5 or more agents per day, or were receiving drugs for chronic diseases. The control group comprised other patients seen by the team over the period. The intervention group made 106 visits to the clinic while the control group made 144. No information was provided on the number of visits excluded.

Study design
The study was a prospective, non-randomised controlled trial, which was conducted at one Veterans Affairs Medical Centre. The follow-up was for 6 months. No information on loss to follow-up was provided. There was no blinding for the assessment of the outcomes.

**Analysis of effectiveness**

It was not stated whether the clinical analysis was based on intention to treat or on treatment completers only. The clinical outcomes reported included:

- the types of drug-related problems identified;
- the categories of drugs discontinued;
- the categories of drugs begun;
- the percentage of the pharmacist-recommended changes in drug therapy that were accepted;
- the mean number of drugs per patient at the start and finish of the study; and
- positive, neutral or negative effects of changes in therapy.

A positive outcome was the achievement of a therapeutic goal, for example, a reduction in blood pressure. A negative outcome was a worsening of the patient's disease state or an adverse drug reaction after change in drug therapy. No information on the comparability of the treatment and control groups was provided. No account was taken of potential confounders.

**Effectiveness results**

The types of drug-related problems identified (out of 220) were:

- drug use without indication, 50.9%;
- untreated indication, 11.4%;
- adverse drug reaction, 9.5%;
- overdose, 9.5%;
- improper drug selection, 7.7%;
- duplication, 3.6%;
- laboratory monitoring necessary, 3.6%;
- subtherapeutic dosage, 3.2%; and
- drug interaction, 0.5%.

The categories of discontinued drugs (out of 112) were:

- psychotropic, 28%;
- cardiovascular, 20%;
- topical, 18%;
- gastrointestinal, 14%; and
other, 20%.

The categories of drugs begun (out of 25) were:

- cardiovascular, 56%;
- central nervous system, 16%;
- musculoskeletal, 8%;
- respiratory, 8%;
- genitourinary, 8%; and
- gastrointestinal, 4%.

The percentage of pharmacist-recommended changes in drug therapy that were accepted was 98.6%.

The mean number of drugs per patient at the end of the study was 7.2 for the treatment group and 7.0 for the control group, (p=0.0007).

The mean change in the number of drugs per patient was -3.4 for the treatment group and -0.4 for the control group, (p=0.0001).

The effects of changes in drug therapy (out of 220) were positive for 47.5%, neutral for 52%, and negative for 0.5%.

**Clinical conclusions**

Pharmacy services in a geriatric primary care clinic led to a statistically significant decrease in the mean number of drugs per patient. These services also achieved positive or neutral clinical outcomes in almost all cases.

**Measure of benefits used in the economic analysis**

There was no summary measure of benefit, although it might have been assumed that the treatment was unequivocally more effective than the control. This study therefore constitutes a cost-consequences analysis.

**Direct costs**

No discounting was carried out as the costs were only incurred over a 1-year period. The resource quantities and the unit costs were not reported separately for the drugs. The costs were reported on a per annum basis for the pharmacist's salary at 5 hours per week (12.5% of $58,000), drugs (costs saved, $18,260; cost incurred, $3,080) and additional laboratory monitoring ($142). It was assumed that the costs related to the date of the study, i.e. 1998. The costs were not reflated as it was inappropriate. No distinction was made between the average and marginal costs. All the costs common to both alternatives were excluded.

**Statistical analysis of costs**

No statistical analysis of the costs was performed.

**Indirect Costs**

The indirect costs were not estimated.

**Currency**

US dollars ($).
Sensitivity analysis
No sensitivity analysis was conducted.

Estimated benefits used in the economic analysis
See the 'Effectiveness Results' section.

Cost results
The costs were reported in terms of cost changes between the intervention and control.

The cost-savings from drug discontinuation were $18,260.

Additional costs due to laboratory monitoring were $142.

Additional costs due to new therapy were $3,080.

Additional costs due to professional services were $7,250.

The total additional costs were $10,472.

The net annual cost-savings ($18,260 minus $10,472) were $7,788.

Synthesis of costs and benefits
Not applicable due to the cost-consequences approach adopted.

Authors' conclusions
Pharmacy services in a geriatric ambulatory clinic decreased the mean number of drugs per patient, and achieved positive or neutral clinical outcomes. They also resulted in net cost-savings to the clinic.

CRD COMMENTARY - Selection of comparators
No explicit justification was given for the comparator. However, as a new service was being assessed, it is assumed that the normal situation was the primary care setting studied without the provision of pharmacy services.

Validity of estimate of measure of effectiveness
The authors acknowledged that the estimate of effectiveness (mainly the drug reduction per patient) of the intervention is likely to have been biased: more patients on larger numbers of drugs were selected for the intervention group than the control group. The authors suggested that one can assume that no reduction in the treatment group would have occurred without the intervention of a pharmacist. However, this is a strong assumption, which also implies the negation of the need for the supposed control group. Finally, the measure of effectiveness in terms of the change in clinical status was poorly defined and not open to scrutiny.

Validity of estimate of measure of benefit
There was no summary measure of benefit.

Validity of estimate of costs
The costing was very limited, in that only changes in the costs due to the introduction of the pharmacy service were included in the analysis. The costs and the quantities were not reported separately for the drugs, although the source of
unit costs was given.

**Other issues**
The article was poorly edited. The results quoted in the text referred to the wrong figures. The figures referred to in the text did not exist. The authors pointed out a number of reasons why the extent of the drug reductions achieved was likely to be inflated. First, the intervention groups were those with larger numbers of drugs per patient. Second, for these, some reduction may have occurred without pharmacy service provision. Third, the number of drug-related problems are likely to taper over time as visits from patients recur.

Consequently, one can only assume that the extent of the annual cost-savings estimated are only obtained where pharmacy services are used selectively, and for the first year of introduction of the service. Clearly, they also only relate to the particular setting of the study, which included only male geriatric patients in the USA.

**Implications of the study**
The authors claim that the results demonstrated the value of pharmacists in multidisciplinary patient care, and consequently they decided to introduce a full time pharmacist to their team. It should be clear from the criticisms made, particularly in terms of the likelihood of bias in effectiveness and the lack of costing, that there is insufficient evidence to support this.

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