Anticoagulation management in primary care: a trial-based economic evaluation
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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 use of a primary care-based model, which involved a practice nurse-led clinic utilising near-patient testing (NPT) for international normalised ratio (INR) testing combined with a computerised decision support system.

Type of intervention
Primary and secondary prevention.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised all patients aged at least 18 years and taking warfarin, who were identified from validated practice lists. Forty patients discontinued the study before 12 months.

Setting
The setting was primary and secondary care. The study was conducted in Birmingham, UK.

Dates to which data relate
The effectiveness data were collected over a 12-month period during 1995 to 1996. The monetary valuation of resource use from the same period was undertaken by attaching unit costs at 1996 prices.

Source of effectiveness data
The evidence for the final outcomes was derived from a single study (see Other Publications of Related Interest).

Link between effectiveness and cost data
The costing appears to have been collected prospectively.

Study sample
Three hundred and sixty-seven patients were initially randomised into nine intervention practices (n=224) and three control practices (n=143). This latter group acted as interpractice controls and received care at the hospital clinic. The former group (intervention practices) were then randomised further into the intervention group (n=122) who received care at the practice clinic, and the intrapractice control group (n=102) who received care at the hospital clinic. Eighteen patients declined to enter the study. Patients who refused to enter the study were monitored through the hospital clinic. The 12 practices were randomly selected from a list of 21 practices in Birmingham that had expressed interest in the study.
New patients receiving warfarin after the study had commenced were identified through the practices' standard mechanisms. These patients were allocated to the intervention or control group by means of computer-generated randomisation codes. All new patients were stabilised in a hospital clinic before inclusion in the study. There was stated to be no significant differences between the intervention and control groups in terms of the age or gender distribution, co-morbidity, or concomitant drug history.

The clinical study was powered to detect a 20% difference in INR control at 5% significance. For the economic evaluation, a 25% difference in the cost per patient per annum was taken to be a significant cost difference. At 80% power and 5% significance, this required 63 patients in each arm of the trial.

**Study design**
The study was a multi-centre randomised controlled trial involving patients from 12 primary care practices. Randomisation was stratified by practice size to ensure that the population base was sufficiently large to meet the sample size criterion. In total, 55 patients left the study (23 of 122 in the intervention group, and 32 of 245 in the control group).

**Analysis of effectiveness**
The clinical study was analysed on an intention to treat basis. When data from the patients who declined to enter the study were analysed, the results were similar to those of the control population. However, those who dropped out of the study before 12 months do not appear to have been analysed. It was stated that the groups were shown to be comparable at analysis in terms of the age and gender distribution, co-morbidity, and concomitant drug history. The primary health outcome used in the analysis was INR control. This was determined by point prevalence of patients achieving individual therapeutic INR targets. The secondary outcome measures included mortality and adverse events.

**Effectiveness results**
The INR point prevalence was 71% (95% confidence interval, CI: 63 - 79) for the intervention and 62% (95% CI: 52 - 71) for the intrapractice control group, (p>0.05).

The percentage of time spent in range was 69% (95% CI: 66 - 73) for the intervention versus 57% (95% CI: 50 - 63) for the intrapractice control, (p<0.001).

The death rates were 3 in each group.

Serious adverse events were 87.3 in the intervention group versus 68.4 in the intrapractice group and 97.3 in the interpractice group.

**Clinical conclusions**
Care given by this model was at least as good as routine hospital follow-up in terms of control of the INR, the percentage of time spent in the range, and serious adverse events.

**Measure of benefits used in the economic analysis**
No summary benefit measure was used. The clinical outcomes were left disaggregated within a cost-consequences analysis.

**Direct costs**
The monetary valuation of resource use was undertaken by attaching unit costs at 1996 prices. It was stated that key resource items, such as the number of visits, were collected on all patients in the trial. Observational data and the volume of patients using the hospital clinics were used to estimate the mean time that staff were involved in each activity. The staff costs were then calculated on the basis of salary scale mid-points plus an additional 40% for
employer costs. The capital costs were derived from purchase prices and were amortised over a 5-year period using HM Treasury's recommended 6% discount rate. The rental costs of the room were based on an estimate provided by one of the practice managers. The prices in 1996 were used.

**Statistical analysis of costs**
The approach adopted was to use the arithmetic mean along with a 95% CI around the mean. This CI was then compared with one derived using the non-parametric bootstrap approach to cope with skewed cost data. For the economic evaluation power calculation, a 25 difference in the cost per patient per annum was taken to be a significant cost difference. At 80% power and 5% significance, this required 63 patients in each arm of the trial.

**Indirect Costs**
The indirect costs were not included. No justification for the exclusion of productivity losses was provided, but it is likely that the vast majority of the study sample were not of a working age. Also, the analysis was conducted from the perspective of the National Health Service, rather than society. The authors also state that "costs to the patient and family will be discussed elsewhere" - see "Other Publications of Related Interest" (2) below.

**Currency**
UK pounds sterling (£).

**Sensitivity analysis**
A one-way sensitivity analysis was employed to consider changes in the costs of the equipment and the number of patients utilising the primary care service. A threshold analysis was used to consider the level at which primary care becomes cost-saving in comparison with the practice of sending the patients to the hospital clinic.

**Estimated benefits used in the economic analysis**
No summary benefit measures were determined in the study. See the 'Effectiveness Results' section.

**Cost results**
The costs per patient per year in primary care were 170 (95% CI: 149 - 190) versus 69 (95% CI: 57 - 81), (p<0.001). Similarly, the costs per first visit and follow-up visit were also significantly less, (p<0.001). The costs per first visit were 13.89 versus 25.41, whilst those per follow-up visit were 6.62 versus 20.18. However, primary care for domiciliary patients was significantly cheaper for both the first visit (22.36 versus 31.39) and follow-up visit (19.21 versus 24.12), (p<0.001). The sensitivity analysis demonstrated that the cost in primary care could be reduced to under 100 per patient per year under plausible changes in the variables, for example, by increasing the number of patients per primary care practice. However, the authors state that if the higher number of visits per patient in primary care is maintained, then primary care will always cost more than the observed hospital model, such that there will be no threshold at which primary care becomes more cost-effective.

**Synthesis of costs and benefits**
Not applicable.

**Authors’ conclusions**
Primary care provided similar levels of control to secondary care for patients on anticoagulation therapy. There was an increased cost of treating patients in primary care, and at no point did primary care become a lower cost option than secondary care. Local decision-makers need to assess the increased cost of anticoagulation management in primary care, in terms of the potential reductions in high-cost serious adverse events.
CRD COMMENTARY - Selection of comparators
The choice of the comparator was justified because the hospital administration of anticoagulation is the traditional method. The authors pointed out that prior research has indicated that primary care management appears to be just as effective, but that there is a need for an economic analysis to compare the relative costs of the two approaches. The generalisability is not likely to have been adversely affected as hospital care is routinely used, certainly in the UK environment.

Validity of estimate of measure of effectiveness
The validity of the measure of effectiveness should be high due to randomisation and the fact that the results were supposed to have been presented on an intention to treat basis. However, the results were presented for treatment completers only. In addition, the groups were stated as being comparable at baseline but no evidence was provided for this statement. Power calculations were undertaken on both clinical and economic samples. Thus, there is evidence that sample size was sufficient to detect any clinically or economically important differences between the groups. There was insufficient discussion of the appropriateness of the effectiveness measure.

Validity of estimate of measure of benefit
No summary measure of benefit was reported due to the cost-consequences approach (see ‘Measure of Effectiveness’ section). The authors also portrayed the effectiveness results as if the intervention was equivalent to the comparator. In fact it was, on average, and according to at least one outcome measure, statistically significantly superior.

Validity of estimate of costs
Statistical and sensitivity analyses of the direct costs were performed. The costs to the patient and family are discussed elsewhere (see "Other Publications of Related Interest" (2) below) and, although not explicitly stated, it appears that the indirect costs may not have been relevant for this study sample. Power calculations were included to determine that the sample size was sufficient to detect differences in the economic analysis.

Other issues
The authors did not discuss the economic findings of any other studies in this area, although they did claim that this was one of the first instances of economic evaluation alongside a clinical trial of primary care anticoagulation. Thus, it is difficult to make comparisons with economic findings from other studies. The authors claim that the results should be generalisable to other primary care settings, largely due to the sensitivity analysis of key variables. However, the sensitivity analysis considered issues of cost-saving, which did not happen in the primary care setting. The sensitivity analyses should have been presented more in terms of cost-effectiveness, i.e. the effects of changes in key variables on both the cost and effectiveness.

Implications of the study
The authors concluded that the study backs up previous research, which suggests that primary care provides similar levels of control to secondary care for patients on anticoagulation therapy. However, given the evidence of better outcomes in this study, local decision-makers need to assess the increased cost of primary care management in terms of the potential reductions in high-cost serious adverse events, most notably stroke. Thus, there is a need for more accurate routine collection of data on the overall incidence of haemorrhages and thrombotic events associated with warfarin therapy.

Source of funding
None stated.

Bibliographic details
Other publications of related interest


Indexing Status
Subject indexing assigned by NLM

MeSH
Aged; Anticoagulants /therapeutic use; Cost Control /methods; Cost-Benefit Analysis; Decision Making, Computer-Assisted; Female; Hospital Costs; Humans; Male; Middle Aged; Nurse Practitioners /economics; Primary Health Care /economics; Warfarin /therapeutic use

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