Clinical and economic evaluation of rapid influenza A virus testing in nursing homes in Calgary, Canada
Church D L, Davies H D, Mitton C, Semeniuk H, Logue M, Maxwell C, Donaldson C

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 rapid influenza A virus infection diagnostic service was studied in an experimental nursing home. The experimental nursing home consisted of nurses trained to collect nasopharyngeal samples, which were immediately sent to a new laboratory service (the Calgary Laboratory Services). The laboratory analysed all nasopharyngeal samples within 2 hours of their receipt (24 hours/day and 7 days/week) using the Directigen Flu-A assay, and immediately relayed the results by telephone to the nursing home. The Directigen Flu-A assay is an enzyme immunoassay that detects influenza A virus nucleoprotein.

Type of intervention
Primary prevention.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised men and women who met the definition of the Laboratory Centre for Disease Control for clinically suspected influenza.

Setting
The setting was an institution. The economic analysis was conducted in Calgary, Canada.

Dates to which data relate
The effectiveness data related to the 1998 to 1999 influenza season. The dates to which the cost data related were not reported, and neither were the price years.

Source of effectiveness data
The effectiveness data were derived from a single prospective study.

Link between effectiveness and cost data
It appears that the costing has been undertaken prospectively on the same group of patients as that used in the effectiveness study.

Study sample
No power calculations to determine the sample size were reported. A total of 1,705 individuals were included in the study, of which 159 were identified as having suspected influenza. There were 80 patients in the experimental group.
and 79 in the control group.

**Study design**
The study was a randomised controlled study that was conducted in 12 nursing homes. The 12 nursing homes, with a total of 1,705 residents, were matched in pairs on the basis of the total number of beds and the annual rate of influenza vaccination. For each matched pair, one nursing home was randomly assigned (by the toss of a coin) to the experimental nursing group, while the other was assigned to the control nursing group. The time horizon was unclear. No loss to follow-up was reported.

**Analysis of effectiveness**
The basis of the analysis was intention to treat. The health outcome measures used in the analysis were numerous. However, the main health outcomes were the influenza attack rate, the duration of the influenza outbreak, the rate of secondary complications, the rate and length of hospital stay, and the mortality rate. Infection prevention measures and infection control measures were documented and compared. The proportion of diagnostic tests ordered for influenza A virus and the median turnaround time for the test results were compared in the two groups. The average age, the gender ratio and the clinical symptoms at enrolment were not statistically different between the two groups.

**Effectiveness results**
The median influenza A virus attack rates were similar in the two groups, 154 per 1,000 residents for the experimental group versus 199 per 1,000 for the control group, (p=0.48). The duration of the influenza outbreak in the control group was significantly longer, 16 days versus 9 days, (p=0.03).

The overall mortality rate was identical in both groups, 8.8% versus 8.9%.

The number of hospitalised patients in the experimental group (n=8, 10%) was somewhat higher than in the control group (n=5, 6.3%), although this difference was not significant.

The rates for all of the other clinical outcomes were not significantly different between the two groups.

The patients enrolled in the experimental group were much more likely to have a diagnostic test ordered for influenza A virus than those in the control group, 98.8% versus 28.8%, (p<0.0001).

The median turnaround time for test results was 1 day (range: 1 - 2) in the experimental group versus 5 days (range: 1 - 20) in the control group, (Wilcoxon rank sum test, p=0.05).

**Clinical conclusions**
The new laboratory service provided for the experimental nursing homes had a significantly higher clinical effectiveness than did current practice.

**Measure of benefits used in the economic analysis**
The authors did not develop a summary benefit measure. A cost-consequences analysis was therefore performed.

**Direct costs**
Only the direct patient care costs and the overhead costs for the Calgary Health Region, the Calgary Laboratory Services, and the provincial Ministry of health were considered. The direct costs were for the laboratory tests, other diagnostic tests (including radiography), administered drugs, general physician consultations and emergency visits (using a hospital-specific per diem department cost), extra consumable items and staffing, and inpatient costs (using a weighted per diem rate). The costs of laboratory tests included overheads, materials, supplies and labour. The costs of administered drugs included vaccination, antibiotics and other medication.
The unit costs were estimated from actual data. The costs and the quantities were not reported separately. Discounting was unnecessary since it appears that the costs have been incurred in less than one year. However, the time horizon was unclear. The dates and price year were not reported. The results were presented for both the total cost (including hospital costs) and the total cost less hospital costs.

**Statistical analysis of costs**
The mean costs were compared using the chi-squared test.

**Indirect Costs**
The indirect costs were not included.

**Currency**
Canadian dollars (Can$).

**Sensitivity analysis**
No sensitivity analysis was carried out.

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

**Cost results**
No significant difference in the costs was observed for any of the resource items.

The results suggested a trend in the experimental group towards lower laboratory costs (Can$24.18 versus 48.87), and thus a lower total cost (Can$69.52 versus 98.55), if the hospital costs were not included.

When the hospital costs were factored in, the authors reported a trend towards a higher total cost for the experimental group (Can$673.30 versus 313.85).

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

**Authors' conclusions**
The rapid testing service reduced the duration of the influenza outbreak and also tended to lower the overall use of resources.

**CRD COMMENTARY - Selection of comparators**
A justification was given for the comparator (standard regional influenza control measures using a reference laboratory in the authors' setting) used. You should consider whether this is a widely used technology in your own setting.

**Validity of estimate of measure of effectiveness**
The estimate of effectiveness should be internally valid given the use of a randomised, controlled trial. However, no power calculations were reported, although the study sample was representative of the study population. The patient groups were shown to be comparable at analysis, suggesting a low risk of confounding factors. Appropriate statistical analyses were performed to ensure the accuracy of the comparison.
Validity of estimate of measure of benefit
The authors did not derive a measure of health benefit. The analysis was therefore a cost-consequences analysis.

Validity of estimate of costs
The authors limited their analysis to the direct costs. However, the exclusion of the indirect costs was probably justified, given that the study population comprised elderly residents in a nursing home. The time horizon was unclear.

Other issues
The limitation of the low generalisability of the results to other setting or countries was addressed. Adequate comparisons were made with studies dealing with the same topic. The authors did not report any limitations of their study, but appear to have reported the cost results selectively. They excluded the hospital costs and reported the more favourable trends stemming from their cost analysis.

Implications of the study
The authors suggest that further study is warranted, particularly on the impact of the cost of resources related to hospitalisation.

Source of funding
None stated.

Bibliographic details

PubMedID
11830797

DOI
10.1086/338960

Other publications of related interest

Indexing Status
Subject indexing assigned by NLM

MeSH
Aged; Aged, 80 and over; Canada /epidemiology; Female; Health Care Costs; Health Services for the Aged /economics; Humans; Influenza A virus /isolation & purification; Influenza, Human /epidemiology; Male; Nursing Homes /economics; Outcome Assessment (Health Care) /economics; Reagent Kits, Diagnostic

AccessionNumber
22002000516

Date bibliographic record published
31/01/2004
Date abstract record published
31/01/2004