A cost-benefit analysis of anti-influenza vaccination in a company in Italy (Snamprogetti)
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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
A campaign for vaccination against influenza in workplaces was studied.

Type of intervention
Vaccination.

Economic study type
Cost-benefit analysis.

Study population
The study population comprised employees of an Italian company (Snamprogetti).

Setting
The setting was the workplace. The economic study was carried out in the offices of Snamprogetti in S.Donato Milanese, in Italy.

Dates to which data relate
The effectiveness and resource use data were gathered between October 1999 and June 2000. The price year was not explicitly reported, but is likely to have been 2000.

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

Link between effectiveness and cost data
The costing was undertaken retrospectively on the same patient sample as that used in the effectiveness analysis.

Study sample
A sample of 153 employees who voluntarily underwent the vaccination was enrolled in the study. This was compared with an equal sample of non-vaccinated employees who were working in the same context. The mean age was 42.92 (+/- 9.68) years in the vaccinated sample and 41.39 (+/- 9.08) years in the non-vaccinated sample. The samples were matched for age and gender. Power calculations to determine the sample size were not performed.

Study design
This was a prospective case-control study, which was carried out in a single centre. The campaign for vaccination against influenza was carried out using the electronic mail service within the company, in October 1999. A total of 153
employees in the study group participated voluntarily and were vaccinated. Employees in the control group were randomly selected, and were matched for age and gender to the participants in the intervention group. The outcome assessment was carried out in June 2000, when the study participants in both groups were sent a questionnaire.

**Analysis of effectiveness**
The primary health outcome assessed in the analysis was the absence from work due to influenza. This was estimated using a questionnaire, and the results were verified by checking the records from the personnel department. All of the patients included in the study were accounted for in the analysis. The study groups were comparable at baseline.

**Effectiveness results**
Thirty-four working days were lost in the intervention group by 10 employees, representing 6% of the group. Of these 10 employees, 6 were absent for 3 days each and 4 were absent for 4 days each.

One hundred and ninety working days were lost in the control group by 43 employees, representing 28% of the group. Of these 43 employees, 10 were absent for 3 days each, 12 for 4 days each, 18 for 5 days each, 2 for 6 days each, and 1 person for 10 days.

**Clinical conclusions**
The anti-influenza vaccination was effective in reducing the number of working days lost by employees by 82%.

**Measure of benefits used in the economic analysis**
The benefit measure used in the cost-benefit approach was the monetary value of the working days lost. This was calculated using the human capital approach, in which every working day lost is assigned an economic value corresponding to the value of the lost productivity, measured using the salary equivalent to one working day. The cost of one working day was calculated on the basis of the gross salary of each employee, divided by the 220 potential working days per annum.

**Direct costs**
The cost/resource boundary of the analysis was that of the Snamprogetti company. The costs included in the analysis were the physicians' and nurses' salaries, the cost of the anti-influenza campaign, administration of the vaccine, employee time lost for administration of the vaccine (5 minutes), and the cost of disposing waste material. The costs for treating influenza were not included in the analysis since they were irrelevant to the perspective of the company. These costs were, in fact, borne by the patients or the National Health Service. The costs were estimated using actual data derived from the personnel department. Discounting was not carried out as the costs were incurred over less than two years. The unit costs and the quantities of resources were reported separately. The price year was not explicitly reported, but is likely to have been 2000.

**Statistical analysis of costs**
No statistical analysis of the costs was performed.

**Indirect Costs**
No indirect costs were included.

**Currency**
Italian lira (L).
Sensitivity analysis
Since there was variation in the average salary of the enrolled employees in the two study groups, a sensitivity analysis was carried out using the mean cost of a working day for all the enrolled employees.

Estimated benefits used in the economic analysis
In the intervention group, the average cost of a working day was L 374,431 and the number of working days lost was 34. Thus, the monetary value of the working days lost was L 12,730,636.

In the comparison group, the average cost of a working day was L 277,202 (due to the lower levels of employees) and the number of working days lost was 190. Thus, the monetary value of the working days lost was L 52,668,434.

The incremental benefit of the vaccination programme was L 35,117,406.

Cost results
The total cost of the vaccination programme was L 4,820,000.

Synthesis of costs and benefits
A ratio of the incremental benefits to costs was calculated and was 12.12, meaning that the monetary benefits of the vaccination programme exceeded the costs by 12 times. When the average cost of a working day for all the enrolled employees was used, the economic benefits were L 45,545,760 and the ratio between the incremental benefits and costs was 9.45.

Authors' conclusions
The implementation of the anti-influenza vaccination programme proved to be cost-saving, reducing the absence from work of the employees.

CRD COMMENTARY - Selection of comparators
The rationale for the choice of the comparator was clear. No vaccination was selected as the comparator since the aim of the study was to assess the active value of the vaccination programme. You should assess whether it represents a comparator in your own setting.

Validity of estimate of measure of effectiveness
A prospective case-control study was used as the basis for the effectiveness analysis. This appears to have been appropriate for the study question. The study sample appears to have been representative of the study population. The study groups were comparable at baseline. Power calculations were not performed.

Validity of estimate of measure of benefit
The benefit measure was calculated using the human capital approach, which is commonly employed in cost-benefit analyses. It appears to have been appropriate from the perspective of the company.

Validity of estimate of costs
All the categories of costs relevant to the perspective adopted appear to have been included in the analysis. The unit costs and the quantities of resources were reported separately. However, statistical analyses on the costs and quantities were not carried out, although one sensitivity analysis was performed. The cost estimates were specific to the study setting.
Other issues
The authors made several comparisons of their findings with those from other studies. The sensitivity analyses were limited to variations in the average salary. However, the generalisability of the study results was enhanced by the fact that the unit costs and the quantities of resources were reported separately. A sample of employees was enrolled and this was reflected in the conclusions of the analysis.

Implications of the study
The authors suggest that further research should develop decision rules, including clinical outcomes and economic aspects of the benefits. The cost-benefit analysis used in the present study could be used for the economic evaluation of other vaccination strategies in other contexts.

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