Cost-benefit analysis of influenza vaccination in a public healthcare unit

Colombo G L, Ferro A, Vinci M, Zordan M, Serra G

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 study examined preventive influenza vaccination (split, Aventis-Pasteur) in healthy working adults.

Type of intervention
Primary prevention.

Economic study type
Cost-benefit analysis.

Study population
The study population comprised employees of an Italian health care unit, Unita Locale Socio Sanitaria No. 17. No further inclusion or exclusion criteria were applied.

Setting
The setting was unclear, but it was likely to have been the workplace. The economic study was carried out in Italy.

Dates to which data relate
The effectiveness data referred to the period 1 December 2002 to 15 April 2003. The dates to which the resource use data referred were not reported, nor was the price year.

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

Link between effectiveness and cost data
The costing was conducted retrospectively on the same sample of patients as that used in the effectiveness study.

Study sample
Power calculations were not used to determine the sample size. The sample comprised 214 employees, 107 employees who voluntarily received influenza vaccination and 107 non-vaccinated employees matched for age, gender and job category. The control cohort was extracted from the total number of non-vaccinated employees by means of a random stratified sampling procedure. Stratification was conducted on age (under or over 40 years), gender and job category; the same characteristics on which matching was conducted.

Study design
This was a single-centred, matched cohort study that was conducted during the flu epidemic season of 2002/2003. The
groups were shown to be comparable at baseline in terms of the matched characteristics. Personnel department records about absences from work were obtained and, in order to assess absences related to influenza-like illness (ILI), employees were contacted by telephone at the end of the study period.

**Analysis of effectiveness**
The primary health outcome was ILI. The analysis of effectiveness was based on the individual's recall of reasons for absence from work. All patients included in the study were accounted for at analysis. No adjustment for confounding factors took place. It was unclear whether characteristics other than those upon which matched was based were considered.

**Effectiveness results**
The total number of people who were declared to have had flu was 24 (22.42%) in the vaccinated cohort and 31 (28.97%) in the non-vaccinated group, (p=0.317).

The total number of working days lost because of flu was 161 in the vaccinated group and 231 in the non-vaccinated group, (p=0.329).

**Clinical conclusions**
The incidence of flu between the two groups was not statistically different.

**Measure of benefits used in the economic analysis**
The measure of benefit used was the reduction in the number of working days lost because of influenza. Production losses were valued using the human capital approach. Further details are provided in the 'Indirect Costs' section.

**Direct costs**
The direct costs included in the economic evaluation were for the vaccine and materials, vaccine administration (physician and nursing time), and the preparation and execution of vaccine administration. Vaccine costs were based on the purchase price of the vaccine, as purchased by the health care unit. Time spent by the doctor and nurse for vaccination was based on authors' assumptions, whereas the cost of their time was derived using the wages of these professionals. The quantities and the costs were analysed separately. Discounting was not relevant given the short time horizon of the study, and was not conducted. The price year was not specified.

**Statistical analysis of costs**
The costs were treated deterministically.

**Indirect Costs**
The indirect vaccination costs included the time spent for employees to be vaccinated and the cost of working days lost because of adverse events caused by the vaccine. The time spent for obtaining the vaccine was based on authors' assumptions. Productivity losses, which were used to derive the benefit ratio measure, were estimated using the human capital approach. The mean annual labour cost to the unit for each job category was used to assess the value of one lost working day. The reduction in productivity losses was used to represent the benefits of the vaccination programme.

**Currency**
Euros (EUR).

**Sensitivity analysis**
A univariate sensitivity analysis was performed in which the average daily cost of labour was varied. The range over which the wages were varied was based on an authors' assumption, which reflected a minimum, average and maximum scenario.

**Estimated benefits used in the economic analysis**
The vaccinated group lost 70 working days less than the non-vaccinated group on account of ILI. The benefit in terms of wages saved was EUR 5,903.47.

**Cost results**
The total cost of vaccination was EUR 1,866.99, or an average of EUR 17.45 per patient.

**Synthesis of costs and benefits**
The costs and benefits were combined by calculating returns, in terms of the reduction in absenteeism from work for the money invested in the vaccination of employees.

In the base-case, the cost-benefit ratio was EUR 4.2. This means that every EUR 1.00 invested in vaccination returns EUR 4.20 saved through less absenteeism from work.

From the sensitivity analysis, when the mean cost of a working day ranged from EUR 100 to EUR 460, the cost-benefit ratio was found to range from EUR 4.5 to EUR 11.7.

**Authors' conclusions**
The results suggested that the influenza vaccination strategy was cost-saving.

**CRD COMMENTARY - Selection of comparators**
The reason for the choice of the comparator was clear. The comparator was chosen because it represented a routine care option provided to employees in the authors' setting. You should decide if it is a valid comparator in your own setting.

**Validity of estimate of measure of effectiveness**
The analysis of effectiveness was based on comparisons between two cohorts, one of which was self-selected in terms of volunteering for influenza vaccination. There is a potential for volunteer bias, as those who accept health protective interventions may constitute a group distinct from those who do not accept such interventions. Although the controls were matched for age, gender and job category, other potentially confounding factors were not considered. It was also unclear whether the sample size was adequate for the study question, or whether all those who volunteered for influenza vaccination were included in the study; the latter may introduce selection bias. Given the observational nature of the study, in addition to the sample selection issues highlighted, the internal validity of the study is likely to be low.

**Validity of estimate of measure of benefit**
The authors used the human capital method for calculating the benefits. This is a valid and widely accepted method. However, the authors acknowledged that by using this method they might have overestimated the benefits, and that friction cost methods could reduce the cost of absenteeism.

**Validity of estimate of costs**
All the categories of costs relevant to the perspective adopted appear to have been included. However, a major component of the cost was the time spent by the employee in obtaining the vaccine and the cost of physician and nurse
time for vaccine administration. The time estimates were based on authors' assumptions and, as such, the estimate of costs must be treated with caution. Discounting was not relevant and was not conducted. The price year was not reported, which will hinder any future reflation exercises.

Other issues
The issue of generalisability to other settings was partially addressed by performing a sensitivity analysis, assuming different average wages for employees. However, a much more extensive analysis would be required to enhance the generalisability. The authors made appropriate comparisons of their results with those of other studies. The findings of the study do not appear to have been selectively reported and the conclusions reflected the scope of the analysis.

Implications of the study
The authors suggest that influenza vaccination of health workers is cost-beneficial from the employer's perspective. They made no recommendations for further research.

Source of funding
Supported by Sanofi-Pasteur-MSD SpA, Rome.

Bibliographic details

PubMedID
18360596

Indexing Status
Subject indexing assigned by CRD

MeSH
Cost-Benefit Analysis; Humans; Influenza Vaccines; Influenza, Human; Italy

AccessionNumber
22006001283

Date bibliographic record published
31/12/2006

Date abstract record published
31/12/2006