The cost-effectiveness of influenza vaccination of healthy adults 50-64 years of age


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 considered the influenza vaccine.

Type of intervention
Primary prevention.

Economic study type
Cost-utility analysis.

Study population
The study population comprised healthy adults aged between 50 and 64 years.

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

Dates to which data relate
The effectiveness evidence and resource use data were taken from sources published between 1982 and 2004. The price year was 2002.

Source of effectiveness data
The effectiveness data were derived from a review or synthesis of published studies.

Modelling
A decision tree model was used to identify the health benefit and costs associated with the vaccination of people aged between 50 and 64 years.

Outcomes assessed in the review
The following model input parameters relating to the effectiveness of influenza vaccination were identified:

the efficacy of the vaccine;

the attack rate of influenza with vaccination;

the probability of an adverse event from vaccination; and

the probabilities of hospitalisation with influenza, pneumonia, and death.
Study designs and other criteria for inclusion in the review
A systematic review of randomised controlled trials (RCTs) was conducted to derive the attack rate of influenza with vaccination. A published systematic review was used to derive the relative efficacy of vaccination compared with placebo. The probabilities of outcomes following influenza were derived from individual studies.

Sources searched to identify primary studies
Not reported.

Criteria used to ensure the validity of primary studies
Not reported.

Methods used to judge relevance and validity, and for extracting data
Not reported.

Number of primary studies included
The model parameters were derived from 39 primary sources.

Methods of combining primary studies
Not reported.

Investigation of differences between primary studies
Not reported.

Results of the review
The following model input parameters were identified:

the efficacy of the vaccine was 0.69;
the probability of an adverse event from vaccination was 0.01;
the probability of influenza was 0.0655;
the probability of pneumonia was 0.0128; and
the probability of death was 0.00075.

Measure of benefits used in the economic analysis
The measure of health benefit used was the quality-adjusted life-years (QALYs). Valuations of health states were taken from patient assessments using an 11-point Likert scale that was reported in the literature. These scores were then converted into time trade-off equivalent scores using a published algorithm.

Direct costs
The direct costs to the health service and to the patient were identified in this study. The patient costs identified were the cost of over-the-counter drugs. The authors provided a breakdown of the unit costs used in the study. The resource use data were taken from the model. The unit costs of hospital care were taken from NHS reference costs, while the unit costs of general practitioner services were taken from unit costs published by the University of Kent. The unit cost
of the influenza vaccine and administration was the reimbursement made by the Prescription Pricing Authority. The price year was 2002.

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

**Indirect Costs**
In the analysis from a societal perspective, the costs of time off work due to influenza were identified. The unit cost for lost work time was taken from the New Earnings Survey. The resource use data were taken from the model that provided the effectiveness data. The price year was 2002.

**Currency**
UK pounds sterling ( ).

**Sensitivity analysis**
A series of one-way and probabilistic sensitivity analyses were used to assess variability in the data. The ranges used in the sensitivity analyses were taken from the literature.

**Estimated benefits used in the economic analysis**
The vaccination of people aged 50 to 64 years resulted in the loss of 50 QALYs (95% confidence interval, CI: 19 to 101) per 100,000 individuals, compared with 156 QALYs (95% CI: 66 to 298) per 100,000 people with no vaccination.

**Cost results**
The total cost to the NHS was £761,697 per 100,000 individuals (95% CI: £465,618 to £1,184,927) if all 50- to 64-year-olds were vaccinated, compared with £108,476 per 100,000 individuals (95% CI: £62,548 to £178,378) for no vaccination. This gives an incremental cost of £653,221 (95% CI: £354,575 to £1,072,257).

The total cost from a societal perspective was £2,136,133 per 100,000 individuals (95% CI: £1,514,071 to £2,950,631) if all 50- to 64-year-olds were vaccinated, compared with £997,064 per 100,000 individuals (95% CI: £344,276 to £2,395,792) for no vaccination. This gives an incremental cost of £1,139,069 (95% CI: £27,052 to £2,030,473).

**Synthesis of costs and benefits**
The cost to the NHS per QALY was £6,174 and the cost to society per QALY was £10,766. The cost per QALY remained below £30,000 in all sensitivity analyses.

**Authors' conclusions**
The vaccination of all healthy 50- to 64-year-olds is a cost-effective intervention.

**CRD COMMENTARY - Selection of comparators**
The authors compared the vaccination against influenza of all healthy people aged between 50 and 64 years with no provision of vaccination to this group of people. The comparator represented current practice in the NHS. You should consider how these options compare with usual practice in your own setting before applying the results of this study.

**Validity of estimate of measure of effectiveness**
The estimate of the relative effectiveness of vaccination was taken from a published systematic review. Other studies
supplied the other effectiveness data. There were no details of the methods used to identify and assess the primary studies. This makes it difficult to comment on the methods used to obtain the model input parameters and, therefore, the quality of the model results. However, many of the model input parameters were taken from meta-analyses that had already been published. This suggests that data from a number of primary studies have been combined in a robust manner.

**Validity of estimate of measure of benefit**
The methods used to derive the QALYs were described. A QALY can potentially capture a broad spectrum of health benefits.

**Validity of estimate of costs**
The economic analysis was undertaken from two perspectives. All appropriate costs for each perspective appear to have been included. A breakdown of the unit costs and details of resource use were provided in the paper. Comprehensive sensitivity analyses were undertaken to assess variability and uncertainty in the resource use and unit cost data. These factors add to the generalisability of the study. A clear price year was reported, which will enable future reflation exercises.

**Other issues**
The authors did not present their results selectively and their conclusion reflected the scope of their analysis. They compared their findings with other similar studies and commented on reasons for any differences. The authors acknowledged that their study only assessed the impact of vaccination on preventing influenza cases and did not account for the influenza vaccine reducing the severity of cases. This means that the study is likely to have underestimated the benefit and overestimated the costs associated with giving the influenza vaccine to all health people aged 50 to 64 years. They also noted that there was considerable uncertainty over the true admission rate for influenza, as patients are rarely virologically tested.

**Implications of the study**
The authors did not make any direct recommendations for changes to practice or further research.

**Source of funding**
Supported by the NHS Health Technology Assessment Programme, the National Institute of Clinical Excellence, the Trent Institute for Health Services Research, and the University Hospitals of Leicester NHS Trust.

**Bibliographic details**

**PubMedID**
16183177

**DOI**
10.1016/j.vaccine.2004.12.033

**Indexing Status**
Subject indexing assigned by NLM

**MeSH**
Cost-Benefit Analysis; Humans; Influenza Vaccines /immunology; Middle Aged; Models, Economic; Vaccination /economics