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
Influenza vaccination.

Type of intervention
Primary prevention.

Economic study type
Cost-effectiveness analysis.

Study population
Elderly individuals aged 65 years and older.

Setting
Primary care. The study was carried out in The Netherlands.

Dates to which data relate
Effectiveness data were collected from studies published between 1980 and 1997. Resource use data were derived from a database relating to the period 1984 to 1993 and a study published in 1998. Cost data were derived from a 1994 source and studies published between 1997 and 1998. The price year was 1995.

Source of effectiveness data
Effectiveness data were derived from a review of the literature.

Modelling
A decision analytic model was used to model the costs and outcomes related to influenza vaccination.

Outcomes assessed in the review
The review assessed the following outcomes:

- population sizes of high risk (HR) and low risk (LR) elderly,
- influenza vaccine efficacy,
- influenza incidence,
- mortality,
excess mortality.

**Study designs and other criteria for inclusion in the review**
Not stated.

**Sources searched to identify primary studies**
Not stated.

**Criteria used to ensure the validity of primary studies**
Not stated.

**Methods used to judge relevance and validity, and for extracting data**
Summary statistics from studies.

**Number of primary studies included**
Approximately 7 studies were included.

**Methods of combining primary studies**
Narrative method.

**Investigation of differences between primary studies**
Not stated.

**Results of the review**
The results were as follows:

35% of elderly were categorised as HR and 65% as LR.

An influenza vaccine efficacy of 56% was assumed.

Mortality with influenza as the primary cause was estimated to be 11.46 deaths per 100,000.

Excess mortality for HR-defining conditions was 65.83 deaths per 100,000, for pneumonia was 6.68 deaths per 100,000, and for other causes of death was 11.24 deaths per 100,000. 77% of excess mortality due to pneumonia was attributed to HR-elderly and 23% to LR-elderly.

**Measure of benefits used in the economic analysis**
Potential years of life lost (PYLL) was used as the measure of benefits. PYLLs were calculated according to standard life tables averaged for men and women according to the gender distribution of influenza (excess) mortality. The authors included a 25% reduction in the PYLL of HR-elderly compared with standard life-table calculations. An annual discount rate of 4% was used.

**Direct costs**
Direct costs were not discounted given the short time frame of the study (less than 1 year). Quantities and costs were reported separately. Direct costs included the costs of hospitalisations, general practitioner visits, and drugs. The
quantity/cost boundary adopted was that of the health service. The estimation of quantities and costs was based on actual data. Unit costs were derived from published sources. For unit cost estimates, charges were used for interactions with GPs and market prices were used for drugs. The price year was 1995.

**Statistical analysis of costs**
Not reported.

**Indirect Costs**
Not included.

**Currency**
Euro (EUR 1 = $US 1.1).

**Sensitivity analysis**
A sensitivity analysis was performed on the following parameters: inpatient days for pneumonia, attribution of mortality and hospital inpatient days to HR-elderly, vaccine efficacy, and discount rate.

**Estimated benefits used in the economic analysis**
The PYLL per death amounted to 6.71 with influenza as the primary cause, 6.68 for HR-defining conditions, 5.7 for pneumonia, and 6.48 for other causes of death.

**Cost results**
Estimated costs related to influenza in The Netherlands amounted to EUR 31,456,000. Total vaccination costs for Dutch elderly were estimated at EUR 15 million.

**Synthesis of costs and benefits**
The cost-effectiveness of the influenza vaccination programme was estimated at EUR 1,820 per life-year gained. Cost-effectiveness for LR-elderly was EUR 6,900, whereas influenza vaccination among HR-elderly was cost-saving. Cost-effectiveness of the vaccination programme and cost-effectiveness for HR-elderly were sensitive to excluding influenza-related hospitalisations for pneumonia, and the efficacy of the vaccine. Cost-effectiveness for LR-elderly was most sensitive to the attribution of mortality.

**Authors’ conclusions**
Influenza vaccination has a cost-effectiveness ratio that is better than, or comparable to, that of other implemented Dutch programmes in the prevention of infectious diseases.

**CRD COMMENTARY - Selection of comparators**
The rationale for the choice of the comparator was clear. You, as a user of this database, should verify whether these health technologies are relevant to your own setting.

**Validity of estimate of measure of benefit**
A relevant measure of benefits was used. The effectiveness data used to construct the decision tree were derived from, what may have been, a non-systematic review of the literature. The internal validity of the data derived from the literature cannot be fully assessed given the limited information provided about the review and the quality assessment of the primary studies. A proportionality assumption was made to attribute mortality and hospital inpatient days to HR-
Validity of estimate of costs
Only direct costs were included. Indirect costs, such as productivity gained due to the prevention of influenza were not considered although this may be reasonable in view of the patient domain studied. The model did not include the general programme costs of providing information to GPs and education of the population. No sensitivity analysis was reported on cost estimates. In some instances, charges were used instead of true opportunity costs.

Other issues
These results only apply to influenza vaccination of elderly individuals aged 65 years and older (83% of high risk elderly and 65% of low-risk elderly). No comparisons with other relevant studies were made and the generalisability of the results to other settings was not discussed. The authors do not appear to have presented their results selectively. The study enrolled elderly aged 65 years and older and this was reflected in the authors’ conclusions.

Implications of the study
Future research should include other options for influenza control such as antiviral treatment.

Source of funding
None stated.

Bibliographic details

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Other publications of related interest


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