Estimating the cost-effectiveness of a national program to eliminate disparities in influenza vaccination rates among elderly minority groups

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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.

CRD summary
This study examined the cost-effectiveness of a hypothetical national influenza vaccination programme for elderly people, designed to eliminate disparities in the vaccination rates for ethnic minorities. The authors concluded that, even with conservative assumptions, the programme was likely to provide good value for money. The cost-effectiveness methods were valid and the uncertainty in the model was investigated. The authors’ conclusions appear to be robust.

Type of economic evaluation
Cost-utility analysis

Study objective
This study examined the cost-effectiveness of a hypothetical national influenza vaccination programme for elderly people, designed to eliminate disparities in the vaccination rates for ethnic minorities.

Interventions
The national influenza vaccination programme aimed to increase the rates of influenza vaccination in African-American and Hispanic people aged over 65 years, to match the rate for Caucasian people over 65 years old. This was compared with no vaccination programme.

The programme had multiple components, including patient reminders; public health education, such as media campaigns; and standing orders, allowing medical staff, such as nurses, to assess patients and administer the vaccine without consulting a doctor.

Location/setting
USA/primary care.

Methods
Analytical approach:
The analysis was based on a Markov model, with a lifetime horizon. The authors stated that it took the perspective of society.

Effectiveness data:
Meta-analyses were used as sources wherever possible. The epidemiological data were from US mortality tables and other local databases. The vaccination rate (coverage) was the key input for the model and the programme was assumed to increase this rate to a maximum of 70% for elderly African-American and Hispanic people, to match the vaccination rate for elderly Caucasian people.

Monetary benefit and utility valuations:
The utility values were from published sources and were applied to influenza-related conditions, for the duration of the 10-year programme.

Measure of benefit:
Quality-adjusted life-years (QALYs) were the summary benefit measure and they were discounted at an annual rate of 3%.
Cost data:
The economic analysis included the costs of vaccination (dose and administration), programme promotion, over-the-counter medications, time spent seeking and receiving vaccination and care, out-patient care, antiviral drugs, hospitalisation, and deaths. The cost of time was based on average hourly wages. The drug costs were estimated using average wholesale prices. Other costs were from published sources that were based on Centers for Medicare and Medicaid Services fee schedules and Healthcare Cost and Utilization Project data. These costs were assumed to have been constant over the 10 years of the programme, except for programme promotion costs, which grew at an annual rate of 3%. All costs were in US $. A 3% annual discount rate was applied and the price year was 2009.

Analysis of uncertainty:
One- and two-way sensitivity analyses were carried out on all the inputs for the model, using published ranges of values where possible. The perspective was restricted to the third-party payer for an alternative scenario, which included only the direct medical costs incurred by the patients. A probabilistic sensitivity analysis was carried out, in which all the parameters were simultaneously varied over their assumed distributions. Gamma distributions were assumed for the cost and duration parameters, and beta distributions were used for the probability and utility variables.

Results
The expected costs were $4,131 with the programme and $4,030 without it. The QALYs were 2.521 with the programme and 2.519 without it. The incremental cost per QALY gained with the programme, was $48,617.

From the perspective of the third-party payer, the incremental cost per QALY gained was $49,240. The most influential inputs were the rate of hospitalisation for influenza (incremental cost per QALY gained range $27,000 to $162,000) and the vaccination rate in year 10 with the programme (range $33,000 to $111,000).

In the two-way sensitivity analysis, varying the programme costs and the vaccination rate achieved in year 10, the incremental cost-effectiveness was less than $100,000 per QALY gained, when the programme cost less than $9 per targeted minority elderly person per year (it was $10 in the main analysis) and the vaccination rates in year 10 were over 60% (70% in the main analysis).

At a willingness-to-pay threshold of $50,000 per QALY gained, the likelihood of the programme being cost-effective was 38%; at a threshold of $100,000 per QALY, it was 73%. Lower programme costs and higher thresholds favoured the cost-effectiveness of the intervention.

Authors' conclusions
The authors concluded that, even with conservative assumptions, the programme was likely to provide good value for money.

CRD commentary
Interventions:
The selection of the comparators was appropriate as the comparison with no programme allowed the assessment of the additional value of the programme to improve vaccination coverage.

Effectiveness/benefits:
Little information on the sources for the clinical data was provided, making it difficult to assess the validity of these parameters. The epidemiological data were appropriately from US studies and meta-analyses, which are usually valid sources for these inputs. Extensive sensitivity analysis was conducted on all the model parameters and conservative assumptions were made against the programme. QALYs were an appropriate benefit measure, given the impact of influenza on morbidity and mortality in elderly people. No details of the sources for the utility weights were given.

Costs:
The main analysis adopted a broad perspective and all the relevant cost categories appear to have been included. A restricted viewpoint was assessed in the sensitivity analysis and might be of interest to health care payers. The costs were presented as category totals and were not broken down to individual items. The data sources were clearly stated and appear to have been relevant for the authors' setting and the perspective. The cost of the vaccination programme was conservatively assumed to be higher than that expected for a multi-component programme. The price year was
appropriately stated, allowing reflation exercises. The impact of variations in the cost estimates was tested in the sensitivity analyses. The economic part of the analysis was satisfactorily investigated.

**Analysis and results:**
The results of the analysis were clearly presented. The costs and benefits were appropriately synthesised in an incremental analysis, with conventional cost-effectiveness thresholds. Appropriate deterministic and probabilistic sensitivity analyses were carried out to assess uncertainty, and the methods and key results were extensively described. The authors stated that most of the assumptions of the model were conservative against the programme, such as the exclusion of herd immunity. The findings were specific to the USA and may be difficult to transfer to other settings, due to differences in epidemiology and demographics.

**Concluding remarks:**
The cost-effectiveness methods were valid and the uncertainty in the model was investigated. The authors’ conclusions appear to be robust.

**Funding**
Supported by the American Foundation for Aging Research, and the University of Pittsburgh School of Medicine, USA.

**Bibliographic details**

**PubMedID**
21406266

**DOI**
10.1016/j.vaccine.2011.02.098

**Original Paper URL**

**Indexing Status**
Subject indexing assigned by NLM

**MeSH**
African Americans; Aged; Cost-Benefit Analysis; Hispanic Americans; Humans; Immunization Programs /economics; Influenza, Human /prevention & control; Markov Chains; Minority Groups; Models, Economic; Quality-Adjusted Life Years; Vaccination /economics

**AccessionNumber**
22011000839

**Date bibliographic record published**
03/08/2011

**Date abstract record published**
19/11/2012