Cost-effectiveness of vaccination against pneumococcal bacteremia among elderly people: results for Belgium

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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
The health technology studied was pneumococcal vaccination of older people for the prevention of pneumococcal pneumonia.

Type of intervention
Primary prevention.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised elderly persons over 65 years of age.

Setting
The setting was primary care and hospital. The economic study was carried out in Belgium.

Dates to which data relate
Effectiveness and resource use data were collected from studies published between 1980 and 1996. Cost data were collected between 1994 and 1996. The price year was 1995.

Source of effectiveness data
Effectiveness data were derived from a non-systematic literature review.

Modelling
A decision analytic model was used to determine the cost-effectiveness of pneumococcal vaccination.

Outcomes assessed in the review
The review assessed the incidence of pneumococcal pneumonia, the frequency and length of hospitalisation, mortality rates and vaccine effectiveness.

Study designs and other criteria for inclusion in the review
Data on the effectiveness of the vaccine were derived from a case-control study.
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
Not stated.

Number of primary studies included
At least 14 studies were included.

Methods of combining primary studies
The narrative method was used to combine data from primary studies.

Investigation of differences between primary studies
Not stated.

Results of the review
The annual incidence of invasive pneumococcal pneumonia per 100,000 people was 28.3 among persons aged between 65 and 74 years, 41.2 among persons aged between 75 and 84 years, and 65.4 among persons aged over 85 years.

The annual incidence of non-invasive pneumococcal pneumonia per 100,000 people was 409.3 among persons aged between 65 and 74 years, 943.5 among persons aged between 75 and 84 years, and 1,947.1 among persons aged over 85 years.

The probability of mortality of pneumococcal pneumonia was 12.8% for persons aged between 65 and 74 years, 19.9% for persons aged between 75 and 84 years, and 26.3% for persons aged over 85 years.

The incidence of invasive pneumococcal pneumonia causing hospitalisation per 100,000 people ranged from 164 among persons aged between 65 and 74 years to 779 among persons aged over 85 years.

The mean length of hospitalisation was 16.5 days for persons aged between 65 and 74 years, 19.1 days for persons aged between 75 and 84 years, and 20.7 days for persons aged over 85 years.

For persons aged between 65 and 74 years, the effectiveness of the vaccine was: 86% in year 1, 81% in year 2, 75% in year 3, 71% in year 4, 66% in year 5, and 61% in year 6.

For persons aged between 75 and 84 years the effectiveness of the vaccine was: 76% in year 1, 68% in year 2, 60% in year 3, 52% in year 4, 44% in year 5, and 36% in year 6.

For persons aged over 85 years the effectiveness of the vaccine was: 62% in year 1, 49% in year 2, 36% in year 3, 23% in year 4, 1% in year 5, and 0% in year 6.

The probability of adverse effects was rated as extremely rare, and was therefore not included in the model.

Measure of benefits used in the economic analysis
The number of life years gained and Quality-Adjusted Life Years (QALYs) gained were used as the measures of benefit. Benefits were discounted at an annual rate of 3%. The quality weights were obtained from a US study.
Direct costs
Direct costs were discounted at an annual rate of 3%. Resource quantities and unit costs were reported separately. Direct costs covered treatment costs for pneumococcal pneumonia, and included GP treatment costs, hospital treatment costs, and the cost of vaccination. The quantity/cost boundary adopted was that of society. The estimation of quantities and costs was based on actual data. Cost calculations were based on RIZIV-data and the results were compared with actual data on invasive infections from four hospitals and, for more detailed data, from a sample of patients with pneumonia from 47 hospitals. The price year was 1995.

Statistical analysis of costs
No statistical analysis of costs was reported.

Indirect Costs
Indirect costs were not included.

Currency
European Currency Unit (ECU) with ECU1 = 38.5 Belgian Francs.

Sensitivity analysis
The authors performed a one-way sensitivity analysis on unit costs and effectiveness parameters using data from an international study, as well as best and worst-case scenario analysis.

Estimated benefits used in the economic analysis
For all elderly people aged 65 years or over, the QALYs gained per vaccinated individual was 0.0007658. The QALYs gained per vaccinated individual was 0.000895, 0.000652 and 0.0003133 for those between 65 and 74 years, between 75 and 84 years, and over 85 years respectively.

Cost results
For all elderly people the total additional costs per vaccinated individual were ECU 22.69.

Total additional costs per vaccinated individual were ECU 22.27 for those between 65 and 74 years, ECU 23.04 for those between 75 and 84, and ECU 24.27 for those over 85 years.

Synthesis of costs and benefits
The incremental cost-effectiveness ratio of vaccination over no vaccination and treatment was ECU 29,632 for all elderly people, ECU 24,872 for those between 65 and 74 years, ECU 35,358 for those between 75 and 84 years, and ECU 77,444 for those over 85 years.

The most sensitive variables included the effectiveness of the vaccination. For all elderly people the incremental cost-effectiveness ratio was ECU 2,405 in the best case and ECU 10,943,140 in the worst case.

Authors' conclusions
"Pneumococcal vaccination to prevent invasive pneumococcal disease is acceptably to moderately cost-effective in Belgium.” The authors encourage public health authorities to consider policies to encourage vaccination in all elderly people.
CRD COMMENTARY - Selection of comparators
A justification was given for the comparator used, namely that it represented current preventive therapy. You, as a user of this database, should decide if this health technology is relevant to your setting.

Validity of estimate of measure of effectiveness
The authors did not state that a systematic review of the literature had been undertaken to identify effectiveness evidence. More details could have been provided about the design of the review and the method of combining primary effectiveness estimates. The effectiveness of the vaccine was based on a case-control study, which is a weak design from which to establish effectiveness. Crucial variables such as the incidence of pneumococcal pneumonia, the frequency of hospitalisation and mortality rates were based on a review of studies with no information being provided about how the estimates from these studies were combined.

Validity of estimate of measure of benefit
The estimation of benefits was obtained directly from the effectiveness analysis. The source for the quality weights was given, but no details were provided on how they were obtained or on the suitability of the population (other than that it was from the USA).

Validity of estimate of costs
Good features of the analysis were that all relevant cost categories were included, quantities and unit costs were reported separately, and sensitivity analyses were conducted on costs and on quantities.

Other issues
The authors made appropriate comparisons of their findings with those from other studies and the issue of generalisability to other settings was addressed. The authors did not present their results selectively. The study examined elderly persons over 65 years of age and this was reflected in the authors’ conclusions.

Implications of the study
On the basis of these findings, the authors believe public health authorities should consider policies for encouraging pneumococcal vaccination for all persons over 65 years in age. As the authors mention, this would depend heavily on the effectiveness of the vaccination and the estimate of effectiveness was based on one study of weak design.

Source of funding
None given.

Bibliographic details

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Other publications of related interest

Indexing Status
Subject indexing assigned by NLM

MeSH
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