Case study: cost-effectiveness analysis of vaccination against pneumococcal pneumonia

Congress of the United States, Office of Technology Assessment

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
Vaccination for pneumococcal pneumonia.

Type of intervention
Primary prevention

Economic study type
Cost-utility analysis.

Study population
Persons aged 2-4; age 5-24; age 25-44; age 45-64 and aged 65+ years.

Setting
The study was carried out in the USA.

Dates to which data relate
It seems that price relates to 1978.

Source of effectiveness data
Single study.

Modelling
Epidemiological cohort model (model of survival and disease).

Measure of benefits used in the economic analysis
Quality-adjusted-life-years (QALYs). 4 descriptive states were used for the health state description. Literature values were used to assess the health states.

Direct costs
Direct costs were to the health service and included: vaccine, treatment of pneumococcal pneumonia, health care due to prolonged life, and side effects of vaccine. Price information related to 1978.

Currency
US dollars ($). In the DH Register of Cost-effectiveness Studies, the original results were converted to UK pounds.
sterling () using GDP purchasing power parities and reflated to 1991 using the NHS pay and prices index.

Sensitivity analysis
Sensitivity analysis was carried out using the method of single parameter variation.

Estimated benefits used in the economic analysis
Incremental QALYs (benefits discounted at 5%) were: 0.00013 for persons aged 2-4 years; 0.000183 for persons aged 5-24 years; 0.00042 for persons aged 25-44 years; 0.00118 for persons aged 45-64 years and; 0.00435 for persons aged 65+ years. Outcome duration was life long and treatment side-effects were included.

Synthesis of costs and benefits
Intervention and comparator cost duration were life long. Costs and benefits were discounted at 5%. The range of incremental cost per QALY gained for vaccination for pneumococcal pneumonia for: aged 2-4 years was 117000 (baseline), with lowest value 10800, and highest value 597000; aged 5-24 years was 83900 (baseline), with lowest value 5000, and highest value 397000; aged 25-44 years was 34700 (baseline), with lowest value of 1520, and highest value of 125000; age 45-64 years was 8650 (baseline), with lowest value of 607, and highest value of 33600 and; aged 65+ years was 1520 (baseline), with lowest value of 455, and highest value of 61700. Sensitive parameters were: duration of immunity conferred by vaccine; efficacy of vaccine; and cost of vaccine.

CRD Commentary
(This commentary was not written by CRD, but by the authors of the DH Register.) 1) The sensitivity analysis reflects the considerable uncertainties underlying the baseline findings. 2) The analysis conservatively excluded herd immunity effects. 3) The quality of data and assumptions is uncertain. 4) Vaccine cost was set at a private sector charge rate of $11.37/vaccine (1978). 5) The authors illustrate the potential cost-effectiveness of vaccinating high risk groups. They highlight two important model assumptions: vaccine efficacy and proportions of pneumococci were constant across age groups. 6) There were no health omissions.

Bibliographic details

Indexing Status
Subject indexing assigned by CRD

MeSH
Adolescent; Adult; Age Factors; Aged; Bacterial Vaccines /administration & dosage; Child; Child, Preschool; Cost-Benefit Analysis; Medicare /economics; Middle Aged; Pneumonia, Pneumococcal /prevention & control /economics /mortality; Quality of Life; Risk; Streptococcus pneumoniae /immunology; United States; Vaccination /economics

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