Pharmacoeconomic assessment of implementing a universal PCV-13 vaccination programme in the Valencian public health system (Spain)


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 assessed the cost-effectiveness of universal vaccination of babies, with a 13-valent pneumococcal conjugate vaccine (PCV). The authors concluded that universal PCV13 vaccination was cost-effective, from the perspective of the public health care payer, if the incidence of other serotypes increased no more than 25%, and there was some herd immunity. The cost-effectiveness framework was conventional and most of the data were from large administrative databases. The authors’ conclusions appear to be robust.

Type of economic evaluation
Cost-effectiveness analysis, cost-utility analysis

Study objective
This study assessed the cost-effectiveness of universal vaccination of babies, with a 13-valent pneumococcal conjugate vaccine (PCV).

Interventions
A three-dose schedule (two doses and a booster) of PCV13, given in the first year of life, was compared with no vaccination.

Location/setting
Spain/primary care.

Methods
Analytical approach:
The analysis was based on a decision tree, with a lifetime horizon. The authors stated that it was carried out from the perspective of the public health care payer.

Effectiveness data:
Large regional or national administrative and hospital-discharge databases supplied the estimates for disease incidence and case fatalities. A key input was the efficacy of vaccination, which was estimated based on the efficacy of heptavalent PCV found in clinical trials. Herd effects and serotype replacement were important parameters and were based on authors’ opinions. Conservative assumptions were generally made.

Monetary benefit and utility valuations:
The utility values were from published studies.

Measure of benefit:
Quality-adjusted life-years (QALYs) and life-years were the summary benefit measures and they were discounted at a rate of 3% per year.

Cost data:
The economic analysis included the costs of vaccination (vaccine acquisition and administration) and the medical costs of pneumococcal diseases, such as meningitis, bacteraemia, pneumonia, and acute otitis media. Vaccine costs were based on the maximum price paid by the public health care system in Spain. The cost of administration was assumed to
be 10% of the vaccine cost. The costs of pneumococcal diseases were based on official data from medical records in the Community of Valencia, as well as local publications. All costs were in Euros (EUR) and the price year was 2009. A 3% annual discount rate was applied.

Analysis of uncertainty:
Alternative scenarios were considered for herd effects and serotype distributions. One-way sensitivity analyses were performed on the effectiveness and cost of vaccination, the coverage of the programme, the incidence and costs of hospital-admitted pneumonia, and the costs and incidence of simple or complex acute otitis media. Estimates were varied to ±10% of their baseline value.

Results
In the base-case cohort, vaccination resulted in 2,729 life-years gained or 3,354 QALYs gained, at an additional cost of EUR 35 million, compared with no vaccination. With vaccination, the incremental cost per life-year gained was EUR 12,794 and the incremental cost per QALY gained was EUR 10,407.

When varying the assumptions on herd effects and serotype replacement, the cost per QALY ranged from EUR 2,391 to EUR 37,638. The vaccine cost and coverage were influential inputs, but in most scenarios the incremental cost per QALY gained remained within the cost-effectiveness threshold of EUR 30,000.

Authors' conclusions
The authors concluded that universal PCV13 vaccination was cost-effective, from the perspective of the public health care payer, if the incidence of other serotypes increased no more than 25%, and there was some herd immunity.

CRD commentary
Interventions:
The selection of the comparators was appropriate as a new PCV was compared against no universal immunisation. A direct comparison of the PCV13 against the heptavalent PCV would have been interesting.

Effectiveness/benefits:
Most of the clinical and epidemiological inputs were from administrative surveillance databases, which gathered information on a large number of patients and allowed the assessment of long-term trends in disease incidence. Assumptions were required and the critical parameters, such as the herd effect and serotype replacement, were varied. Generally, the assumptions were conservative against vaccination, and were varied in extensive sensitivity analyses. Both benefit measures were appropriate for estimating the impact of the disease on the patients' health. They are also generalisable and allow comparisons to be made with the benefits of other health care interventions. The sources for the utility values for the QALYs were not reported.

Costs:
The economic analysis was appropriately carried out and was consistent with the viewpoint of the public payer. The sources for the unit costs and resource quantities were appropriate and reflected the authors' setting. Most of the costs were from hospital databases and were reported as totals for each medical condition. This was due to the hospital accounting system, but reduces the transparency of the analysis. The unit costs and resource quantities were not reported separately. Discounting and the price year were clearly reported. The impact of variations in the cost estimates was tested in the sensitivity analyses.

Analysis and results:
The model outcomes were clearly presented and the authors reported a number of other health outcomes for vaccination, such as cases prevented. An incremental approach was used to combine the costs and benefits of the two strategies. The main structure and pathways of the decision model were clearly reported. The uncertainty was investigated, using a deterministic approach, for selected inputs. The transferability of the results was not discussed, but the authors compared their results with those of other published studies, which also showed the importance of herd effects in the cost-effectiveness of vaccination.

Concluding remarks:
The cost-effectiveness framework was conventional and most of the data were from large administrative databases. The
authors' conclusions appear to be robust.

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