Cost-effectiveness of pneumococcal conjugate vaccination in Latin America and the Caribbean: a regional analysis

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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 routine pneumococcal vaccination of infants, compared with no vaccination, in Latin America and the Caribbean. The authors concluded that vaccination was cost-effective or cost saving depending on the vaccine acquisition price. The methods were valid and, despite the limited reporting of the clinical data sources, the authors’ conclusions appear to be robust.

Type of economic evaluation
Cost-utility analysis

Study objective
This study examined the cost-effectiveness of routine pneumococcal vaccination of infants, compared with no vaccination, in Latin America and the Caribbean.

Interventions
Vaccination was a seven-valent pneumococcal conjugate vaccine administered in three doses (at two, four, and six months old) and this was compared with no vaccination.

Location/setting
Latin America and the Caribbean (45 countries)/primary care.

Methods

Analytical approach:
The analysis was based on a decision analytic model and the horizon seemed to be a lifetime. The authors stated that a societal perspective was adopted, with a secondary analysis from the perspective of the health care system.

Effectiveness data:
Most of the clinical and epidemiological data were from a systematic review of published and unpublished literature; the methods of this review were published elsewhere. Other data were from selected sources. Vaccine efficacy was a key model input and was from a clinical trial carried out in Northern California by Kaiser Permanente. The data from studies conducted outside Latin America and the Caribbean were adjusted to the specific characteristics of this area.

Monetary benefit and utility valuations:
The disability weights were from a published source, but its details were not given.

Measure of benefit:
Disability-adjusted life-years (DALYs) were the summary benefit measure and they were discounted at an annual rate of 3%. Other model outputs, such as cases of acute otitis media, pneumonia, and pneumococcal disease, were also reported.

Cost data:
The economic analysis included the costs of vaccination (acquisition, administration, and losses from waste), treatment of pneumococcal disease (hospital stay, personnel time, out-patient visits, diagnostic tests, and medications), and non-medical items (transport and parent or carer time). The vaccine price was not available for Latin America and the
Caribbean, so it was based on an estimate from another setting. The resources associated with pneumococcal disease were from detailed interviews with 57 physicians in 10 Latin American and Caribbean countries. The unit costs were from finance departments of local hospitals, national administrative data, and national formulary data. Non-medical costs were from interviews with a sample of 60 parents of sick children and official hourly wages for each of the countries. All costs were in US dollars ($). A 3% annual discount rate was applied to future costs and the price year was 2005.

Analysis of uncertainty:
A standard deterministic sensitivity analysis was undertaken using plausible ranges of values for the model inputs. One-way analyses were carried out on all the inputs and two-way analyses were carried out on the most influential inputs only.

Results
In the whole birth cohort of all the countries, vaccination resulted in 2,032,000 DALYs, while no vaccination resulted in 2,354,000 DALYs.

At a vaccine cost per dose of $53, the net cost of vaccination was $1,650 million, resulting in an incremental cost per DALY averted of $5,252 ($5,735 from the health care perspective). At a price per dose of $40 or less, vaccination was cost-effective, at the cost-effectiveness threshold of per capita gross domestic product. The breakeven price at which vaccination became cost-saving was $3.50 per dose (less than $1 from the health care system perspective).

The sensitivity analysis showed that the most influential model inputs were the vaccine price, disease costs, and pneumonia-related vaccine efficacy, but the conclusions were the same.

Authors' conclusions
The authors concluded that vaccination was cost-effective or cost saving depending on the vaccine acquisition price.

CRD commentary
Interventions:
The selection of the comparators was valid as the proposed vaccination was compared with no vaccination, which was the usual care in the setting.

Effectiveness/benefits:
The authors used a published systematic review to identify the relevant sources of data, but the search criteria and the methods of the source studies were not reported, which limits the possibility of judging the validity of the clinical estimates. The vaccine efficacy was from a randomised controlled trial, while most of the epidemiological data were from Latin American sources, and this was appropriate. DALYs are an appropriate benefit measure given the setting, but the derivation of the disability weights was not provided.

Costs:
The analysis of costs was well conducted and presented. The data sources, types of costs, price year, use of discounting, and key assumptions were clearly reported. Some unit costs were reported, while other costs were presented as category totals. The cost estimates were treated deterministically, but plausible variations were considered in the sensitivity analysis.

Analysis and results:
The incremental results were clearly presented and discussed. Various vaccine prices were considered as this value was not known in the authors’ setting. The sensitivity analysis was limited and not presented in detail. The authors pointed out that their analysis was conservative, as it excluded herd protection in the base case. They compared their results with those of other published economic evaluations, which had generally similar findings.

Concluding remarks:
The methods were valid and, despite the limited reporting of the clinical data sources, the authors’ conclusions appear to be robust.
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