Cost-effectiveness of the CRM-based 7-valent pneumococcal conjugated vaccine (PCV7) in Argentina
Giglio ND, Cane AD, Micone P, Gentile A

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 routine infant vaccination, using heptavalent pneumococcal conjugate vaccine (PCV7), compared with no vaccination. The authors concluded that routine vaccination using PCV7 prevented a clinically significant number of pneumococcal-related infections and the associated mortality and morbidity and was highly cost-effective. The methods were valid and the most influential inputs were clearly highlighted. The authors’ conclusions appear to be robust.

Type of economic evaluation
Cost-effectiveness analysis

Study objective
This study assessed the cost-effectiveness of routine infant vaccination with heptavalent pneumococcal conjugate vaccine (PCV7) compared with no vaccination.

Interventions
The intervention incorporated PCV7 into the routine paediatric vaccination programme. The vaccination schedule consisted of three primary doses, given during the first year of life, at two, four, and six months of age, followed by a booster in the second year of life. The comparator was no immunisation.

Location/setting
Argentina/primary care.

Methods
Analytical approach:
The economic evaluation was based on a Markov analytic model, with a lifetime horizon. The authors stated that a societal perspective was adopted.

Effectiveness data:
The clinical inputs were identified through a literature review, in commonly used electronic databases and national and international conferences reports. The authors stated that data from Argentinian sources were used, where possible, but international sources were necessary for some items. The primary input was the vaccine efficacy and this was derived from a pivotal clinical trial.

Monetary benefit and utility valuations:
Not considered.

Measure of benefit:
Life-years (LYs) 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 and treatment of pneumococcal disease and its sequelae, including both the direct medical and indirect non-medical costs, such as productivity losses. The resource use data were from various sources, including a hospital database, the international literature, a Delphi panel, and interviews.
with the parents of five patients suffering from neurological and hearing sequelae. The unit costs were from the National Fee Schedule, Union Health Insurance, and official statistics. These costs were initially assessed in Argentinian pesos and converted into US dollars ($). The price year was 2007 and a 3% annual discount rate was applied.

Analysis of uncertainty:
Alternative perspectives were considered, namely public and private. Sensitivity analyses were carried out to examine the impact of changes in the mortality, vaccine efficacy, and the cost per vaccine dose, on the incremental cost-effectiveness ratios (ICERs). A multivariate sensitivity analysis was performed to generate worst- and best-case scenarios by varying the the mortality and the use of lower and upper confidence intervals for vaccine efficacy for primary events.

Results
Over the first five years, in a birth cohort of 696,451, vaccination saved 159 lives in comparison with no vaccination. It required an investment of $73,823,806. The disease costs were $150,051,264 in the unvaccinated cohort and $139,663,878 in the vaccinated cohort from a societal perspective. Thus, the incremental cost was $63,436,419 with vaccination.

The incremental cost per LY gained with vaccination was $5,599.42 from the societal perspective, $5,827.76 from the perspective of the public sector, and $5,777.68 from the perspective of the private sector.

When the effect of herd immunity was considered, the ICER fell to $2,821.83. The ICER ranged from $1,768.83 in the best-case scenario to $35,497.06 in the worst-case scenario. The most influential inputs were mortality secondary to pneumonia, and vaccine efficacy. Vaccination remained cost-effective, at a threshold of three times the Argentinian gross domestic product, as long as the cost of a dose of vaccine was lower than $135 (it was $26.5 in the base case).

Authors’ conclusions
The authors concluded that routine vaccination using PCV7 prevented a clinically significant number of pneumococcal-related infections and the associated mortality and morbidity and was highly cost-effective.

CRD commentary
Interventions:
The selection of the comparators was appropriate as the usual pattern of care in the authors’ setting, which was no vaccination, was compared against the proposed universal immunisation.

Effectiveness/benefits:
A systematic review of the literature is generally a valid source of clinical evidence as it allows the identification of all the relevant sources of data. Limited information on the methods and conduct of this review was provided and the authors did not report the design and other characteristics of the data sources, which would have helped to objectively assess the validity of the clinical inputs. Only selected data were varied in the sensitivity analysis. LYs were an appropriate benefit measure and they allow cross-disease comparisons.

Costs:
The economic analysis was consistent with the main perspective, for both the cost categories and the data sources. The costs were reported as total categories and were not broken down into individual items. The data sources were given and they reflected the country-specific health care setting. The sensitivity analysis considered only variations in the price of vaccine, while the impact of changes in other economic inputs was not investigated.

Analysis and results:
The results were extensively reported, with several model outcomes given in addition to the costs and LYs. An incremental analysis was appropriately used and sensitivity analyses were carried out on selected inputs. The authors stated that the main limitation of their analysis was the need for clinical data from other countries (for example, on herd immunity). In general, the authors used assumptions that were conservative against the vaccination strategy.

Concluding remarks:
The methods were valid and the most influential inputs were clearly highlighted. The authors’ conclusions appear to be robust.

**Funding**
Supported by Wyeth (now Pfizer).

**Bibliographic details**

**PubMedID**
20064478

**DOI**
10.1016/j.vaccine.2009.12.070

**Original Paper URL**
http://dx.doi.org/10.1016/j.vaccine.2009.12.070

**Indexing Status**
Subject indexing assigned by NLM

**MeSH**
Argentina /epidemiology; Child, Preschool; Cost-Benefit Analysis; Heptavalent Pneumococcal Conjugate Vaccine; Humans; Infant; Models, Statistical; Pneumococcal Infections /economics /epidemiology /prevention & control; Pneumococcal Vaccines /economics /immunology; Vaccination /economics

**AccessionNumber**
22010000665

**Date bibliographic record published**
04/08/2010

**Date abstract record published**
24/11/2010