Economic analysis of prevaccination serotesting compared with presumptive immunization for polio, diphtheria, and tetanus in internationally adopted and immigrant infants

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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
The study examined the cost-effectiveness of a policy of pre-vaccination serotesting versus presumptive vaccination with either inactivated polio or diphtheria-tetanus-acellular pertussis (DTaP) in internationally adopted or immigrant infants. From the perspective of US society, presumptive vaccination for polio was more cost-effective than pre-vaccination serotesting, while for the DTaP case, presumptive vaccination was the preferred strategy in populations with poor vaccine compliance or low seroprevalence. Overall, the study methodology was good, but there were few details of the clinical sources of data and assumptions were needed for key parameters. The authors' conclusions should therefore be interpreted with some caution.

Type of economic evaluation
Cost-effectiveness analysis

Study objective
The objective of the study was to examine the cost-effectiveness of a policy of pre-vaccination serotesting versus presumptive vaccination in hypothetical 12-month-old internationally adopted or immigrant infants with either inactivated polio (IPV) or diphtheria-tetanus-acellular pertussis (DTaP).

Interventions
Two separate analyses were carried out. In the first, pre-vaccination serotesting for poliovirus types 1, 2 and 3 antibodies was compared with a vaccination for IPV. In the second, pre-vaccination serotesting for diphtheria antibody and tetanus toxoid was compared with vaccination for DTaP. Infants who were not protected with pre-vaccination serotesting were assumed to receive vaccination thereafter.

Location/setting
USA/primary care.

Methods
Analytical approach:
This economic evaluation was based on two decision models for the two comparisons under examination. The time horizon of the analysis was not reported. The authors stated that a societal perspective was adopted in the study.

Effectiveness data:
The clinical data appear to have been derived from a selection of known, relevant studies. Search criteria were not described and there was little information on the source of the data. Seroprevalence of antibody protection for polio, diphtheria and tetanus was taken from peer-reviewed studies, details of which were not given. Vaccine antibody response was obtained from the Centers for Disease Control and Prevention (CDC). Expert opinions were also used in the model for other specific inputs (e.g. compliance with vaccination).

Monetary benefit and utility valuations:
The summary benefit measure was the proportion of protected patients. This was estimated using the decision model.

Measure of benefit:
None.
Cost data:
The analysis included the costs of serotesting, vaccination (acquisition and administration) and lost wages per medical visit. The healthcare costs were derived from the University of Washington Medical Center. Charges were converted to costs using a hospital-specific Medicare charge-to-cost ratio. Lost wages were valued using data published by the US Bureau of Labor Statistics. Resource use appears to have been estimated from published sources. The costs were in US dollars ($). The price year was 2004.

Analysis of uncertainty:
The issue of uncertainty was addressed by means of a deterministic analysis. Specifically, a univariate sensitivity analysis was carried out on all probabilities and costs. A two-way sensitivity analysis was performed on seroprevalence and vaccination compliance. The authors presumably defined the ranges of values used.

Results
In the IPV model, the rate of protection was 95.3% with presumptive vaccination and 94.0% with pre-vaccination serotesting. The corresponding cost per patient was $57.00 versus $61.91.

The incremental analysis showed that presumptive vaccination was the dominant strategy since it was simultaneously more effective and less expensive. The sensitivity analysis showed that the findings were sensitive to changes in seroprevalence and serotesting cost. For example, at a seroprevalence for polio of 69% (62% in the base-case), presumptive vaccination was no longer less costly.

In the DTaP model, the rate of protection was 91.5% with presumptive vaccination and 92.3% with pre-vaccination serotesting. The corresponding cost per patient was $61.60 versus $118.80.

The incremental cost per patient protected with serotesting over presumptive vaccination was $7,148. Nevertheless, the sensitivity analysis identified several scenarios under which presumptive vaccination was the preferred strategy (i.e. if >80% of patients do not complete the full vaccine series, or if antibody seroprevalence to both diphtheria and tetanus is <51%).

Authors' conclusions
The authors concluded that presumptive vaccination for polio was more cost-effective than pre-vaccination serotesting in internationally adopted and immigrant infants from the perspective of US society. Less robust conclusions were drawn for the DTaP case, although presumptive vaccination was the preferred strategy in populations with poor vaccine compliance or low seroprevalence of antibodies to diphtheria and tetanus.

CRD commentary
Interventions:
The authors provided a justification for the selection of the comparators, which were appropriately chosen and may also be relevant outside the US setting.

Effectiveness/benefits:
The authors provided only limited details of the approach used to derive the sources of clinical data and on the types of sources used. Except for a publication by the CDC, there was no information on the characteristics of the other studies. This limits both the transparency of the clinical estimates and the possibility of objectively assessing the validity of these data. Expert opinion was also needed because of the lack of published studies in this specific patient population. The sensitivity analysis partially overcame this limitation by considering variations in clinical inputs. The benefit measure was very specific and cannot easily be compared with the benefits of other health care interventions.

Costs:
The cost analysis was carried out according to the authors' stated perspective. The unit costs were presented, but there was little information on resource use. The sources used to derive economic inputs were reported and reflected the US accounting system, especially in a large medical institution such as the University of Washington Medical Center. A cost-to-charge ratio was appropriately applied to convert charges into true costs. The price year was reported, which enhances the possibility of conducting reflation exercises in other time periods.
Analysis and results:
The synthesis of the costs and benefits was appropriate. The results of the base-case and the alternative analyses were presented clearly. The issue of uncertainty was investigated using a deterministic sensitivity analysis, which tests only individual model inputs.

Concluding remarks:
Overall, the study methodology was good, but there were few details of the clinical sources of data and assumptions were needed for key parameters. The authors’ conclusions should therefore be interpreted with some caution.

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