Universal vaccination of children against hepatitis A in Chile: a cost-effectiveness study

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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 a routine hepatitis A vaccination programme for toddlers in comparison with no vaccination. The analysis took into account the specific effect of vaccination-induced herd immunity. The authors concluded that the vaccination programme was highly cost-effective from the perspectives of both the public payer and Chilean society. On the whole, the study was well conducted, although the data sources could have been described in more detail. The authors’ conclusions appear to be valid.

Type of economic evaluation
Cost-effectiveness analysis

Study objective
This study examined the cost-effectiveness of a routine hepatitis A vaccination programme for toddlers (from one year old to school age) in comparison with no vaccination. The analysis took into account the specific effect of vaccination-induced herd immunity.

Interventions
The strategy was a routine hepatitis A two-dose vaccination programme, administered at ages 12 and 18 months. This immunisation strategy was compared with no vaccination.

Location/setting
Chile/primary care.

Methods

Analytical approach:
This economic evaluation used a population-based dynamic model with a lifetime horizon of 100 years. The authors stated that the study was carried out from the perspective both of the public payer and of society.

Effectiveness data:
The clinical inputs came from a selection of known, relevant studies that, wherever possible, were based on Chilean sources. Some demographic data came from the World Health Organization and the Chilean census. Other estimates came from published studies, which were reported without further details. Some assumptions were also made on vaccine coverage and force of infection (epidemiology). The key clinical endpoint was vaccine efficacy.

Monetary benefit and utility valuations:
Not relevant.

Measure of benefit:
Life-years (LYs) were the summary benefit measure and were discounted at an annual rate of 3%. Other model outputs such as number of hepatitis A infections and symptomatic cases were also presented.

Cost data:
The economic analysis considered the following cost categories: out-patient services, hospitalisations, treatment of sudden and severe hepatic failure with liver transplantation, and vaccination (acquisition, administration, and adverse events). In the societal analysis, the parental earnings lost for children aged less than 15 years, productivity loss for adults, and sick leave for older patients were also considered. The unit costs and resource quantities were presented.
separately for various items, but hospital costs were reported only as a macro-category. The costs and quantities were derived from published studies. Costs were in US dollars ($) and the price year was 2005. Future costs were discounted at an annual rate of 3%.

Analysis of uncertainty:
A series of one-way and multivariate sensitivity analyses were carried out to consider the issue of uncertainty around the model inputs such as vaccination coverage, time horizon, force of infection, discount rate, herd immunity, and disease costs.

Results
Over 100 years, assuming 95% vaccination coverage, the vaccine would reduce hepatitis A infections from 228,666 to 46,693 and would avoid 107,109 symptomatic cases.

The expected direct medical costs were $21,361,150 with no vaccination and $8,487,826 with vaccination. From the societal perspective, total costs were $42,184,151 with no vaccination and $23,518,342 with vaccination. The LYs lost were 6,541.2 without vaccination and 2,795.7 with vaccination. Thus, under base-case assumptions, the vaccination strategy was dominant, which means it was less expensive and more effective.

The vaccination programme became cost-saving after eight years (six years if considering societal costs).

The sensitivity analysis corroborated these base-case findings in that vaccination remained the dominant strategy, except in scenarios with very short time horizons.

Authors' conclusions
The authors concluded that the routine vaccination programme was highly cost-effective from the perspectives of both the public payer and Chilean society.

CRD commentary
Interventions:
The comparator of no vaccination was appropriately selected to reflect the current pattern of care in the authors’ setting. The two-schedule vaccination strategy was the one recommended by the US Advisory Committee on Immunization Practices.

Effectiveness/benefits:
The derivation of clinical data was based on sources already known to the authors. This strategy was intended to select country-specific data, whenever possible. However, the authors did not provide any information on the design and other characteristics (patient population, follow-up, etc) of the published studies used to populate the decision model. This limits the possibility of judging the validity of the clinical estimates. The benefit measure is generalisable and will allow cross-disease comparisons to be made. Furthermore, LYs are appropriate as they capture the burden of disease on patient health. Other model outputs were appropriately reported and provided useful additional information.

Costs:
The economic analysis considered two different perspectives, which makes the findings relevant for various payers. The categories of costs reflected these two points of view. Some data on the unit costs and resources were presented separately. However, no information on the sources of data was provided, which reduces the transparency of the economic analysis and the possibility of reproducing the study in another context. Other details such as the price year and use of discounting were reported.

Analysis and results:
The dominance of vaccination does not require the use of an incremental analysis to calculate a cost-effectiveness ratio. The study findings were extensively presented. The issue of uncertainty was investigated using a deterministic approach, which considered the impact of the key model assumptions. The use of more sophisticated approaches may not have been necessary given that the base-case findings appeared to be robust. The main strengths of the study were the use of a population-based dynamic model and the inclusion of herd immunity. This improves previous economic
evaluations, which had only considered primary or secondary infections.

Concluding remarks:
On the whole, the study was well conducted, although the data sources could have been described in more detail. The authors' conclusions appear to be valid.

Funding
Not stated.

Bibliographic details

PubMedID
18510790

Original Paper URL
http://www.ingentaconnect.com/content/paho/pajph/2008/00000023/00000005/art00002?token=00571ed791ec2b9a93b89867323d45237b592441384d572066213e773568293c62207d673f582f6b7bd99b3

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Indexing Status
Subject indexing assigned by NLM

MeSH
Adolescent; Adult; Aged; Aged, 80 and over; Child; Child, Preschool; Chile /epidemiology; Cost-Benefit Analysis; Demography; Female; Hepatitis A /economics /epidemiology /prevention & control; Hepatitis A Vaccines /administration & dosage /economics; Humans; Immunization /statistics & numerical data; Infant; Infant, Newborn; Male; Middle Aged; Models, Theoretical; Preventive Health Services /economics; Universal Coverage /economics

AccessionNumber
22008102244

Date bibliographic record published
31/03/2009

Date abstract record published
19/08/2009