Economic evaluation of varicella vaccination in Spain: results from a dynamic model
Lenne X, Diez Domingo J, Gil A, Ridao M, Lluch J A, Dervaux B

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.

Health technology
The study evaluated varicella vaccination (OKA/Merck) in the Spanish context. Two strategies were analysed:
routine vaccination for children aged 1 to 2 years; and
routine vaccination for children aged 1 to 2 years, accompanied by a catch-up programme during the first year for children aged 2 to 11 years.

Type of intervention
Primary prevention.

Economic study type
Cost-effectiveness analysis.

Study population
The study used modelling techniques. The costs and benefits were studied in a hypothetical cohort comprising the population of Spain.

Setting
The setting was the community and inpatient care. The geographical location of the study was Spain.

Dates to which data relate
The demographic data pertained to 2004. The effectiveness data used to populate the model came from studies published between 1999 and 2002. The price year was 2004.

Source of effectiveness data
The clinical parameters associated with the programme included:
force of varicella infection in the absence of vaccination at different ages,
force of varicella due to zoster,
the efficacy of the vaccine,
the age distribution of varicella coverage rates,
the varicella hospitalisation rates,
the varicella fatality rates, and
the relative propensity of break-through varicella to induce medical care or death.

**Modelling**
A model developed for varicella transmission in the USA (Halloran et al. 1994, see 'Other Publications of Related Interest' below for bibliographic details) was used. This allowed an assessment of the vaccination programme, not only in terms of the numbers of cases but also in the age distribution of cases. Details are given in a previous study (Coudeville et al. 2004, see 'Other Publications of Related Interest' below for bibliographic details).

**Sources searched to identify primary studies**
The data were obtained from the literature. Transmission parameters for the situation with no vaccination were estimated from data about varicella seroprevalence in the absence of vaccination, as derived from the literature. Age-specific varicella fatality rates were derived from a meta analysis of US and UK data.

**Methods used to judge relevance and validity, and for extracting data**
The methods used to select the estimates were neither reported nor discussed. No inclusion criteria for any of the parameters were specified. The sources searched for primary studies were not described, and the methods used to judge relevance and validity were not reported.

**Measure of benefits used in the economic analysis**
The authors did not derive a summary measure of benefit. In effect, a cost-consequences analysis was performed.

**Direct costs**
The study reported the direct costs to the health service for varicella vaccination and treatment. The unit costs and resource quantities were provided separately. The direct costs covered vaccination, chickenpox treatment, medical consultations, prescriptions, hospitalisations, additional examinations and over-the-counter medications. The unit costs were estimated on the basis of Spanish sources and expert opinion. Varicella costs were discounted at an annual rate of 3% in the base-case.

**Statistical analysis of costs**
No statistical analyses of the costs were conducted. The data were used in a deterministic manner.

**Indirect Costs**
The indirect costs were calculated by considering the work losses experienced by parents and adult patients.

**Currency**
Euros (EUR).

**Sensitivity analysis**
Both univariate and probabilistic sensitivity analyses were performed to examine variability in the outcome measures due to changes in the input parameters. Best- and worst-case scenarios were examined in the univariate analysis. The discount rates were varied from 0 to 5%. Timeframes of 25 and 100 years were also considered in the sensitivity analysis. A probabilistic sensitivity analysis was performed for cost-related parameters (Monte-Carlo simulations with 10,000 iterations) in order to determine the 95% confidence intervals (CIs) associated with the base-case results.

**Estimated benefits used in the economic analysis**
Savings in resources were considered as benefits. The life-years gained were also estimated.

Cost results
The vaccination programme would result in an annual cost of EUR 12.8 million.

A massive catch-up programme during the first year would cost EUR 371 million.

Synthesis of costs and benefits
From the societal perspective, 1 EUR invested in vaccination would result in a saving of EUR 1.05 in direct costs and EUR 3.7 in total costs.

From the Spanish health system perspective, the cost per life-year saved was EUR 3,982 (95% CI: 2,301 to 12,454).

The catch-up programme would cost EUR 8,638 (95% CI: 4,226 to 17,760) per life-year saved.

Authors' conclusions
A varicella vaccination programme for children in Spain may be cost-effective for the Spanish Health Care System without taking into account the potential impact on zoster incidence.

CRD COMMENTARY - Selection of comparators
Although no explicit justification was provided for the comparator used, it would appear to represent current practice in the authors' setting. You should decide if the comparator represents current practice in your own setting.

Validity of estimate of measure of effectiveness
The authors combined data from a variety of sources but no systematic search for data was reported. It was therefore not possible to judge the validity of the data given the information reported in this paper. These details might have been presented in the original study reporting the model.

Validity of estimate of measure of benefit
The estimation of health benefits was modelled using the Halloran model. Details of the model were not provided, although the authors referred to a paper in which the model was modified for Spain.

Validity of estimate of costs
Both a societal and a health care provider perspective were examined. The sources of the resource use and unit cost data were reported, and the costs were discounted appropriately. The unit costs and the resource quantities were reported separately and the price year was specified. These factors will increase both the generalisability and the transferability of the results.

Other issues
The authors made appropriate comparisons of their findings with those from other studies, and provided explanations for the wide range of findings reported by others. The authors acknowledged that they were not able to capture the impact of varicella vaccination on herpes zoster infection.

Implications of the study
The findings of the study support the introduction of varicella vaccination programmes in Spain. No specific recommendations for further research were made.
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Other publications of related interest
Because readers are likely to encounter and assess individual publications, NHS EED abstracts reflect the original publication as it is written, as a stand-alone paper. Where NHS EED abstractors are able to identify positively that a publication is significantly linked to or informed by other publications, these will be referenced in the text of the abstract and their bibliographic details recorded here for information.


Indexing Status
Subject indexing assigned by NLM

MeSH
Adolescent; Adult; Aged; Aged, 80 and over; Chickenpox /economics /epidemiology /prevention & control; Child; Child, Preschool; Cost Savings; Costs and Cost Analysis; Female; Humans; Immunity, Herd /immunology; Infant; Male; Mass Vaccination /economics; Middle Aged; Models, Immunological; Models, Statistical; Spain /epidemiology

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