Cost effectiveness of herpes zoster vaccine in Canada

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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 herpes zoster vaccination compared with no vaccination for adults aged 60 years or older. The authors concluded that herpes zoster vaccination, especially for those aged 60 to 75 years, was likely to be cost-effective from the perspective of the health care payer. The study was well conducted and the issue of uncertainty was satisfactorily investigated. The authors’ conclusions appear to be robust.

Type of economic evaluation
Cost-utility analysis

Study objective
This study examined the cost-effectiveness of herpes zoster vaccination compared with no vaccination in adults aged 60 years or older.

Interventions
Herpes zoster vaccination was compared with no vaccination.

Location/setting
Canada/primary care.

Methods
Analytical approach:
The analysis was based on a discrete-event simulation model with a lifetime horizon. The authors stated that the study was carried out from the perspective of the Canadian health care payer.

Effectiveness data:
The clinical data came from a selection of relevant studies and country-specific databases, including the Shingles Prevention Study (Oxman, et al. 2005, see ‘Other Publications of Related Interest’ below for bibliographic details), which was a double-blind, randomised placebo-controlled trial. The key input was the efficacy of the vaccination in reducing herpes zoster-related events, and this was from the Shingles Prevention Study. Assumptions on the waning of vaccine efficacy were also needed and were based on data from published observational studies and a large clinical trial.

Monetary benefit and utility valuations:
The utility values were derived from several published studies that used the European Quality of life (EQ-5D) and the Zoster Brief Pain Inventory (ZBPI) questionnaires. The preferences were mainly those of patients with herpes zoster.

Measure of benefit:
Quality-adjusted life-years (QALYs) were the summary benefit measure and they were discounted at an annual rate of 5%.

Cost data:
The economic analysis included the costs of vaccination (acquisition and administration), physician visits, hospitalisations, and drugs for the management of the acute phase of herpes zoster and of post-herpetic neuralgia (PHN). The unit costs and resource quantities were from a Government of British Columbia payment schedule database, a hospital cost model, and published studies. The vaccine cost was from a US source as it was not in use in Canada at the time of this study. The costs were in Canadian dollars (CAD) and were discounted at an annual rate of
5%. The price year was 2008.

Analysis of uncertainty:
A deterministic one-way sensitivity analysis was undertaken on parameters, such as age, vaccine protection length, vaccine cost, PHN length, and proportion of the population with previous varicella zoster virus infection. A probabilistic approach, based on pre-determined probability distributions for the model inputs, was used to generate confidence intervals (CIs) and to construct cost-effectiveness acceptability curves for various willingness-to-pay (WTP) thresholds. The expected value of perfect information was estimated, considering the uncertainty in all parameters, as well as an expected value of partial perfect information, considering the uncertainty in selected inputs.

Results
In those aged 60 years or older, with vaccination over no vaccination, the additional costs were CAD 115 (95% CI 53 to 174) and the QALYs gained were 0.0028 (95% CI -0.0018 to 0.0092). The incremental cost per QALY gained was CAD 41,709. This figure fell to CAD 35,357 when vaccination was restricted to those aged 60 to 74 years, and it rose to CAD 64,996 for those aged 75 years or older.

The most influential model inputs were the age at the time of vaccination, vaccine costs, vaccine protection duration, PHN length, quality of life weights for PHN and herpes zoster, discount rate, and proportion of the population that had previous varicella zoster virus infection. The probabilistic analysis showed that the probability of being cost-effective was 52% at a WTP threshold of CAD 50,000 and 71% at a threshold of CAD 100,000. As long as the vaccine cost was below CAD 150 vaccination remained cost-effective.

The expected value of perfect information was estimated at CAD 47.72 per person. The expected value of partial perfect information analysis showed that further research on the average length of PHN, quality of life weights for PHN and herpes zoster, and the duration of vaccine protection, generated the highest monetary benefit.

Authors' conclusions
The authors concluded that herpes zoster vaccination for adults, especially those aged 60 to 75 years, was likely to be cost-effective from the perspective of the health care payer.

CRD commentary
Interventions:
The comparators were appropriately selected as the usual state in the authors’ setting, which was no vaccination, was compared with the proposed immunisation strategy.

Effectiveness/benefits:
The authors selected the relevant sources of data, without a literature review. Most of the evidence came from a large clinical trial and these are generally considered to be valid sources of evidence. The epidemiological data were from appropriate Canadian databases. Little information was given on the methods of most of these data sources, but extensive details of the derivation and calculation of the health-related quality of life values were appropriately reported. The authors did not consider issues around the use of data from different sources, but wide ranges of values for most estimates were considered in the sensitivity analyses. QALYs were an appropriate benefit measure as they capture the impact of the interventions on the patients’ health.

Costs:
The economic analysis was consistent with the perspective of the third-party payer and included the relevant categories of costs. The unit costs were from official sources, which reflected the economic viewpoint of the health service payer. Some information on the unit costs and resource quantities was given. A large administrative database was appropriately used to obtain most of the resource use estimates. Reflation exercises for other time periods will be feasible as the price year was reported. The costs were treated stochastically.

Analysis and results:
The results were clearly reported and the costs and benefits of the two strategies were appropriately synthesised in an incremental analysis. The issue of uncertainty was extensively analysed, using various approaches, and the findings were
clearly reported and discussed. Conventional discounting was applied to both the costs and benefits, and the impact of varying the discount rates (including no discounting) was considered in the sensitivity analyses. The authors compared their results with those of other published studies and highlighted the differences and similarities. The main limitation of their analysis appears to have been the lack of evidence for the duration of vaccine protection and the cost of the vaccine in Canada.

Concluding remarks:
The study was well conducted and the issue of uncertainty was satisfactorily investigated. The authors’ conclusions appear to be robust.

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