The cost-effectiveness of hepatitis A vaccination in patients with chronic hepatitis C
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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.

Health technology
Hepatitis A vaccination in patients with chronic hepatitis C.

Type of intervention
Primary prevention.

Economic study type
Cost-effectiveness analysis.

Study population
The study population was a hypothetical cohort of North American adults with chronic HCV.

Setting
The study setting was hospital. The economic study was carried out in Canada.

Dates to which data relate
Effectiveness and resource use data were collected from studies published between 1983 and 1998. Cost data were taken from hospital records. The price year was 1998.

Source of effectiveness data
Effectiveness data were derived from a literature review and from expert opinion.

Modelling
A five-year decision analytic model in Data 3.0 (TreeAge Software) was used to determine the cost-effectiveness of the three vaccination policies.

Outcomes assessed in the review
The review assessed the probability of immunity and infection, efficacy of vaccination, adverse effects of vaccination, and clinical course of HAV infection.

Study designs and other criteria for inclusion in the review
Not stated.

Sources searched to identify primary studies
NHS Economic Evaluation Database (NHS EED)
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Criteria used to ensure the validity of primary studies
Not stated.

Methods used to judge relevance and validity, and for extracting data
Summary statistics from individual studies were used.

Number of primary studies included
At least 12 primary studies were included in the review.

Methods of combining primary studies
Primary studies were combined using the narrative method.

Investigation of differences between primary studies
Not stated.

Results of the review
The results of the review were as follows:

The prevalence of immunity to HAV was 50%.

The annual incidence of HAV infection was 0.01%.

Screening for HAV antibodies had a sensitivity of 99% and a specificity of 99%.

In the absence of an adverse effect of vaccination, 80% of patients in the selective and universal strategies who had received a primary dose were assumed to return for a booster dose at 6 months.

A single dose and an additional booster dose of Havrix at 6 months conferred immunity in 37.6% and 94.3% of individuals.

Of those patients vaccinated, 37.5% experienced an adverse effect.

Patients with serious reactions were hospitalised for 1 day.

Eighty percent of susceptible adult patients with HCV infected with HAV became symptomatic. In these patients, the risk of acute liver failure was 7%, the remainder having moderate hepatitis requiring 5 days of hospitalisation.

One third of patients with HCV with acute liver failure underwent orthotopic liver transplantation, of whom 50% would survive 5 years.

If not undergoing transplantation, mortality rate was 14.3%.

Methods used to derive estimates of effectiveness
Estimates of effectiveness were also derived from authors’ assumptions.

Estimates of effectiveness and key assumptions
Ten percent of patients with a minor reaction to vaccination sought medical attention. The proportion of patients with a serious adverse reaction to vaccination was 0.01%. Susceptible patients returned after testing for an initial dose of Havrix, of whom 80% complied.

**Measure of benefits used in the economic analysis**

The measures of benefits were the number of symptomatic cases of HAV infection prevented, liver transplantations prevented, and HAV-related deaths prevented.

**Direct costs**

It was not clear if direct costs were discounted (the time horizon was greater than 1 year). Quantities and costs were reported separately. Direct costs included vaccination-related costs and costs of hepatitis outcomes. The quantity/cost boundary adopted was that of the health service. The estimation of quantities and costs was based on actual data. Costs and quantities were obtained from hospital records. The price year was 1998.

**Statistical analysis of costs**

No statistical analysis was reported.

**Indirect Costs**

Indirect costs were not included.

**Currency**

Canadian dollars (Can$).

**Sensitivity analysis**

One-way and two-way sensitivity analyses were conducted on all model parameters over plausible ranges.

**Estimated benefits used in the economic analysis**

For every 1,000,000 patients vaccinated, selective vaccination prevented 128 cases of symptomatic HAV, 3 liver transplantations, and 3 deaths compared with no vaccination.

For every 1,000,000 patients vaccinated, selective vaccination prevented 162 cases of symptomatic HAV, 4 liver transplantations, and 3 deaths compared with no vaccination.

**Cost results**

The costs per patient were Can$2 with no vaccination, Can$56 with selective vaccination, and Can$82 with universal vaccination.

**Synthesis of costs and benefits**

Costs and benefits were not combined into cost-effectiveness ratios. Vaccination increased costs if the annual rate of infection was less than 0.56%. If the probability of immunity to HAV was below 10%, universal vaccination was less costly than selective vaccination. If the cost of the HAV vaccine was below Can$0.2 per dose, universal vaccination was more cost-effective than no vaccination. If the cost of serological screening exceeded Can$49, universal vaccination was less costly than selective vaccination.

**Authors' conclusions**
Vaccination of North American patients with chronic HCV against HAV infection is not a cost-effective therapy.

CRD COMMENTARY - Selection of comparators
A justification was given for the comparators used, namely no vaccination. You, as a user of the database, should decide if these health technologies are relevant to your setting.

Validity of estimate of measure of effectiveness
The authors undertook a literature review to derive estimates for the model which seemed appropriate, although they did not state that a systematic review of the literature had been undertaken. More information about the methods of the review could have been provided. Some estimates were based on the opinion of the authors. The validity of results was enhanced, however, by sensitivity analyses to account for variability in the estimates.

Validity of estimate of measure of benefit
Estimation of benefits was appropriately obtained directly from the effectiveness analysis through the modelling techniques used.

Validity of estimate of costs
Good features of the cost analysis were that all relevant direct cost categories were included, quantities and costs were reported separately, and the price year was reported. In addition, the validity of the cost results was enhanced by appropriate sensitivity analyses over plausible ranges. The authors did not report if direct costs had been discounted. They did not include indirect costs, such as disease control costs and productivity losses, which were substantial. For a societal perspective these would be required (more applicable to the UK NHS).

Other issues
The authors did make appropriate comparisons of their findings with those from other studies and the issue of generalisability to other settings was addressed. The authors did not present their results selectively. The study considered North American patients with chronic HCV and this was reflected in the authors’ conclusions. The authors acknowledged that effects on quality of life and, thus, morbidity averted by vaccination, were not considered. In terms of generalisability, the authors did not consider the impact of vaccines combining inactivated HAV with other vaccines (such as hepatitis B) that are currently on the market.

Implications of the study
The recommendation that all patients with chronic liver disease be vaccinated against HAV should be reconsidered unless substantial shifts in the incidence of HAV infection occur in North America. More data on the outcomes of liver transplantation in patients with HCV need to be collected.

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