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 compared four hepatitis B virus vaccination strategies, which were incorporated into a syringe-exchange programme, for people who used injection drugs. The authors concluded that the syringe-exchange programme should incorporate an accelerated vaccination strategy and the most cost-effective option was to administer the first dose at all screening visits. The methods were generally adequate, but the lack of reporting in some areas means that the authors' conclusions should be considered with caution.

Type of economic evaluation
Cost-effectiveness analysis, cost-utility analysis

Study objective
The objective was to compare the cost-effectiveness of four alternative strategies for hepatitis B virus (HBV) vaccination for people aged over 18 years, who used injection drugs. This group was considered to be at high risk. Vaccination strategies were offered through existing needle-exchange schemes.

Interventions
The four strategies were based on two vaccination programmes. In the standard programme, doses were administered at zero, one, and six months and, in the accelerated programme, they were administered at zero, one, and two months.

In two strategies, the first dose of each programme was administered at a serologic screening visit, with further doses administered only to those susceptible. In the other two strategies, the first dose and follow-up doses of each programme were administered only to those susceptible after screening.

All four strategies were compared with no vaccination.

Location/setting
USA/primary care.

Methods
Analytical approach:
A Markov model was constructed to assess the costs and long-term effectiveness of the vaccination strategies. The time horizon was the patients' lifetime. The authors reported that the health service provider perspective was adopted.

Effectiveness data:
Vaccination programme details were obtained from a study conducted by the authors. The basic details were reported, but for a full appraisal the reader was referred to Heimer et al (in press, see 'Other Publications of Related Interest' below for bibliographic details). Additional data for the model were obtained from various published studies. The key clinical estimates were the acute infection rate, mortality, rates of different chronic infections, cirrhosis, and hepatocellular carcinoma, and liver transplantation rates and these were transformed into transition probabilities for the model.

Monetary benefit and utility valuations:
The utilities were derived from a published study.
Measure of benefit:
The number of acute HBV infections prevented and quality-adjusted life-years (QALYs) were the measures of benefit. QALYs were discounted at an annual rate of 3%.

Cost data:
The analysis included the vaccination programme costs, such as personnel, supply, vaccine, and participant incentives, and other medical costs. The programme costs were based on authors' estimates. The other medical costs were obtained from published studies and they included acute infection costs (non-hospital, hospital, sudden severe infection, chronic carrier, compensated cirrhosis, decompensated cirrhosis, and hepatocellular carcinoma) and liver transplantation costs (first year and follow-up years). All costs were appropriately adjusted and reported in US dollars ($) for the price year 2003. Future costs were discounted at an annual rate of 3%.

Analysis of uncertainty:
Deterministic sensitivity analysis was conducted by varying the following model parameters: the probabilities of disease progression, percentage of susceptible people using injection drugs, vaccine completion rates, successful immunisation rates, rate of people ceasing to inject, and rate of access to medical care.

Results
All results were presented in a disaggregated format. All strategies resulted in cost-savings compared with no vaccination.

Both the strategies that included the accelerated vaccination programme, when compared with no vaccination, produced better cost-savings and benefits than the two strategies that included the standard programme. The accelerated programme, with the first dose administrated at the screening visit, prevented 45% more acute infections and saved 43% to 50% more QALYs, while resulting in 99% to 127% more savings compared with the accelerated programme, with the first dose only given to susceptible people after receiving the screening results.

The sensitivity analyses demonstrated that these results were robust to variations in the cost of the vaccine. The results were most sensitive to variations in the susceptibility rate, the annual incidence of acute infection, the injection cessation rate, and the access to medical care rate.

Authors' conclusions
The authors concluded that syringe-exchange programmes should incorporate HBV vaccination programmes. The accelerated programme with doses administered at zero, one, and two months, and with the first dose administered to everyone at their first screening visit, was the most cost-effective strategy.

CRD commentary
Interventions:
The rationale for the selection of the comparators was clearly reported. The strategies were realistic alternatives in the authors' setting and were compared with the recommended practice.

Effectiveness/benefits:
The effectiveness data were derived from a study conducted by the authors, and, for the Markov model, this was supplemented by published literature. Full details of the clinical study were not reported and it is not possible to assess its quality. The reader was referred to Heimer et al (in press) for full details. Very limited details were provided for the published sources used to derive the model inputs. It was not clear how these studies were identified or selected for use and it was not clear if the methods were systematic or ad-hoc, which makes it difficult to ascertain if the best available evidence was used. Similarly, no information on the derivation of the utility valuations was provided, and no assessment of their validity can be made. QALYs are a validated benefit measure, which allow cross-disease comparisons.

Costs:
The costs reflected the perspective adopted. They were reported as macro-categories and no information on the resource consumption was provided. Vaccination programme costs were based on authors' estimates and, with the exception of the cost of the vaccine, the uncertainty around these estimates was not investigated, which limits the
The generalisability of the results. The price year and discounting were reported.

**Analysis and results:**
The model was clearly described and a diagram was presented. An incremental analysis was not conducted, so the results showed the benefits and cost-savings of each strategy compared with no vaccination. The issue of uncertainty was partially addressed and the uncertainty around the economic inputs and utilities was not investigated. A more comprehensive approach might have included a probabilistic analysis, which is considered to be the gold standard. These issues limit the generalisability of the study findings. The authors did not discuss any limitations to their study.

**Concluding remarks:**
The methods were generally adequate, but the lack of reporting in some areas means that the authors’ conclusions should be considered with this in mind.

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