Costs and cost-effectiveness of different follow-up schedules for detection of occupational hepatitis C virus infection

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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
The objective was to assess the cost-effectiveness of early hepatitis C virus (HCV) ribonucleic acid (RNA) testing after occupational exposure to HCV. The authors concluded that HCV RNA screening was reasonably cost-effective. Overall, the methodology was adequate, but more details on how the clinical data were identified should have been reported. Both the methods used in the cost analysis and the results were reported in detail. Given the scope of the analysis, the authors’ conclusions appear to be valid.

Type of economic evaluation
Cost-utility analysis

Study objective
The objective was to assess the cost-effectiveness of early hepatitis C virus (HCV) ribonucleic acid (RNA) testing, after occupational exposure to HCV, with existing follow-up strategies.

Interventions
Four recommendations for follow-up in the detection of occupational HCV in health care workers, after HCV exposure, were considered.

In the French strategy, antibodies against HCV and alanine transaminase (ALT) activity were monitored and HCV RNA was tested to confirm a positive antibody result, ALT elevation, or both.

In the European strategy, ALT activity was monitored monthly for four months, antibodies against HCV were monitored at six months, and HCV RNA was tested to confirm ALT elevation or a positive antibody result.

In the baseline-US strategy, antibodies against HCV and ALT activity were monitored at six months and HCV RNA was tested to confirm a positive antibody result.

In the alternative-US strategy, HCV RNA was tested at one month after HCV exposure.

Location/setting
France/out-patient secondary care.

Methods
Analytical approach:
A decision tree model was used to compare the costs and benefits of the four follow-up strategies for the detection of occupational HCV. The time horizon of the analysis was the lifetime of the patient. The authors reported that a societal perspective was adopted.

Effectiveness data:
The clinical and effectiveness data were derived from published studies. The main clinical effectiveness estimates were the sensitivity and specificity of the screening tests, which were derived from published studies.

Monetary benefit and utility valuations:
The utilities were derived from published studies. Health-related quality of life associated with chronic hepatitis C was derived from a published study involving a cohort of Spanish patients (San Miguel, et al. 2003, see ‘Other Publications of Related Interest’ below for bibliographic details). The utilities for other health states, such as before and after treatment and the period waiting for test results, were also derived from published studies.

Measure of benefit:
Quality-adjusted life-years (QALYs) were the summary measure of benefit. As they could be generated over the lifetime of the patient, future benefits were discounted at an annual rate of 3%.

Cost data:
The direct costs were those associated with screening tests, out-patient visits, treatment of acute hepatitis C, and treatment and follow-up of chronic hepatitis C for those who did not respond or relapsed after early treatment in the acute phase. The costs of screening were obtained from the French Nomenclature des Actes de Biologie Medicale. Out-patient doctor consultation fees were obtained from the French Nomenclature Generale des Actes Professionnels. The lifetime costs of treatment and follow-up of chronic hepatitis C were derived from the Spanish study that was used to derive some of the health state utilities (San Miguel, et al. 2003). The price year was 2006 and as future costs could be incurred over the lifetime of the patient, they were discounted at an annual rate of 3%. All costs were reported in Euros (EUR).

Analysis of uncertainty:
A series of one-sensitivity analyses was undertaken by varying: the HCV transmission rate; the distribution of the appearance of antibodies to HCV, ALT elevation, and HCV RNA detection; quality of life estimates; proportion of patients who spontaneously cleared HCV during the acute phase; and the costs of treatment and follow-up of chronic hepatitis C.

Results
Assuming a low HCV transmission risk, the average QALYs gained were 23.2498 with baseline-US, 23.2551 with European, 23.2616 with alternative-US, and 23.2501 with French. Assuming a low HCV transmission risk, the average cost per patient was EUR 77.70 with baseline-US, EUR 125.60 with European, EUR 149.70 with alternative-US, and EUR 152.00 with French.

Assuming a high HCV transmission risk, the QALYs gained were 23.1870 with European, 23.2090 with alternative-US, 23.1850 with French, and 23.0830 with baseline-US. Assuming a high HCV transmission risk the average cost per patient was EUR 525.00 with European, EUR 540.30 with alternative-US, EUR 550.70 with French, and EUR 740.60 with baseline-US.

The costs and benefits were combined using an incremental cost-utility ratio (ICUR; the additional cost per QALY gained).
Assuming a low HCV transmission risk, compared with the baseline-US strategy, the ICUR for the alternative-US strategy was EUR 6,102. The European strategy was weakly dominated by the alternative-US strategy, which means the ICUR of the European strategy versus the baseline-US strategy was higher than the ICUR of the alternative-US strategy versus the European strategy. The French strategy was dominated by the alternative-US strategy, which means it was more costly and less effective.

Assuming a high HCV transmission risk, compared with the European strategy the ICUR of the alternative-US strategy was EUR 695. Both the French and baseline-US strategies were strongly dominated by both the European and alternative-US strategies.

The sensitivity analysis showed that these results were robust to variations in: the distribution of the appearance of antibodies to HCV, ALT elevation, and HCV RNA detection; the proportion of patients who spontaneously cleared HCV during the acute phase; and the costs of treatment and follow-up of chronic hepatitis C. The results were sensitive to changes in the quality of life.

Authors' conclusions
The authors concluded that early HCV RNA screening was reasonably cost-effective for all risks of HCV transmission.

**CRD commentary**

**Interventions:**
The interventions were reported clearly and in full.

**Effectiveness/benefits:**
The authors reported that the clinical and effectiveness estimates were derived from published studies. They did not report the methods used to identify the relevant studies, nor if a systematic review of the literature was undertaken. As a result, it is not possible to determine if all the relevant information was included.

**Costs:**
The authors reported that a societal perspective was adopted, but only the direct health care costs and no productivity losses appear to have been included. The authors adequately reported the sources from which the costs were derived. The price year, time horizon, and discount rate were all reported.

**Analysis and results:**
A decision tree model was used to synthesise all the available evidence. A series of one-way sensitivity analyses assessed the robustness of the results. Although this type of analysis goes some way towards evaluating uncertainty, probabilistic sensitivity analysis would have been a more thorough way to capture the overall model uncertainty. In their discussion, the authors acknowledged the limitations of their study, noting that the costs of time lost, by patients who attended out-patient visits, were not included.

**Concluding remarks:**
Overall, the methodology was adequate, but more details on how clinical data were identified should have been reported. Both the methods used in the cost analysis and the results were reported in detail. Given the scope of the analysis, the authors’ conclusions appear to be valid.

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