The cost-effectiveness of birth-cohort screening for hepatitis C antibody in US primary care settings

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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 screening once in 2006, for hepatitis C virus in primary care, using antibody testing, for all those born between 1945 and 1965 (the birth cohort), who were visiting a primary care provider. The authors concluded that birth-cohort screening was cost-effective. The cost-effectiveness methods were robust and the authors’ conclusions appear to be valid.

Type of economic evaluation
Cost-utility analysis

Study objective
This study examined the cost-effectiveness of screening once in 2006, for hepatitis C virus in primary care, using antibody testing, for all those born between 1945 and 1965 (the birth cohort), who were visiting a primary care provider.

Interventions
Four strategies were considered: no screening and no treatment; screening by risk (18.5% of the cohort); screening the birth cohort; and screening the birth cohort with additional direct-acting antiviral treatment for those with genotype one disease. All patients with hepatitis C identified by screening were treated with pegylated interferon and ribavirin.

Location/setting
USA/primary care.

Methods
Analytical approach:
The analysis was based on a Markov chain simulation, with a lifetime horizon. The authors stated that a societal perspective was adopted.

Effectiveness data:
National databases, clinical trials, and other published studies supplied the clinical data. Screening adherence was from US observational studies. Background mortality was from US life tables. The effectiveness of treatment, defined as the change in sustained virological response, was a key input for the model and was from clinical trials.

Monetary benefit and utility valuations:
The utility values were from published studies.

Measure of benefit:
Quality-adjusted life-years (QALYs) were the summary benefit measure and were discounted at an annual rate of 3%.

Cost data:
The economic analysis included the direct medical costs of screening, treatment, out-patient visits, laboratory tests, and the treatment of various stages of hepatitis, as well as the indirect costs of productivity lost. The costs of screening were from a federally qualified health centre that conducted routine hepatitis B screening, substituting the cost of the hepatitis C test. The drug costs were from the Kaiser Permanente Health System of Georgia. Other direct medical costs
were based on the Medicare fee schedule. Productivity losses were valued using median weekly wages from the Bureau of Labor Statistics. All costs were in US $ and the price year was 2010. A 3% annual discount rate was applied.

Analysis of uncertainty:
A Monte Carlo simulation was used to assess the uncertainty in each of the model's key parameters, using predefined probability distributions. Univariate sensitivity analyses were carried out on selected inputs. Cost-effectiveness acceptability curves were created for various willingness-to-pay (WTP) thresholds.

Results
The birth cohort included 66.9 million Americans who were born between 1945 and 1965 and who visited a primary care provider in 2006.

The expected medical costs per person were $219 with no screening, $246 with risk screening, $327 with birth-cohort screening, and $530 with birth-cohort screening plus antiviral treatment. The productivity losses per person were $49 with no screening, $83 with risk screening, $186 with birth-cohort screening, and $183 with birth-cohort screening plus antiviral treatment. The QALYs per person were 16.354 with no screening, 16.356 with risk screening, 16.361 with birth-cohort screening, and 16.364 with birth-cohort screening plus antiviral treatment.

The incremental cost per QALY gained was $15,700 with risk screening over no screening, $15,700 with birth-cohort screening over risk screening, $35,700 with birth-cohort screening plus antivirals over risk screening, and $73,700 with birth-cohort screening with antivirals over birth-cohort screening alone.

These results, especially those for birth-cohort screening, were affected by changes in the inclusion of QALY losses from the disease states before liver disease, the discount rate, the probability of a sustained virological response with genotype one disease, and the cost of treatment. The most cost-effective strategy depended on the WTP threshold: up to $16,000 per QALY, no screening was preferred; between $16,000 and $75,000 per QALY, birth-cohort screening was preferred; above $75,000 per QALY, birth-cohort screening with antiviral treatment was preferred.

Authors' conclusions
The authors concluded that birth-cohort screening for hepatitis C virus in primary care was cost-effective.

CRD commentary
Interventions:
The selection of the comparators was appropriate and they are likely to be generalisable to other health care settings. The birth cohort from 1945 to 1965 was selected because it had the highest prevalence of hepatitis C virus.

Effectiveness/benefits:
The clinical data were from various sources, which were not fully described and no literature review was conducted to identify them. The treatment effect was appropriately from clinical trials, while the epidemiological and behavioural estimates seem to have been from local US sources. Some assumptions were needed, but an extensive sensitivity analysis was conducted on all the clinical parameters. QALYs were an appropriate benefit measure, given the impact of hepatitis C on survival and quality of life. Several model outcomes were appropriately reported to assess the impact of the screening and treatment strategies on the patients' health. The sources for the health utility weights were not described.

Costs:
The economic analysis had a broad perspective and all the relevant cost categories appear to have been included. Clear information was provided on the data sources, which were appropriate. The price year was reported, allowing reflation exercises. The costs were mainly presented as category totals and were not broken down to individual items, except for the tests and treatment. Statistical analyses of the costs were performed. The costs were varied in the probabilistic sensitivity analysis.

Analysis and results:
The results were extensively presented in an appendix. An incremental approach was appropriately used to synthesise the costs and benefits of the strategies. The uncertainty was satisfactorily investigated and the methods and results were
clearly reported. The types of probability distribution assigned to the model inputs were clearly stated. The authors acknowledged some limitations of their analysis, mainly due to the need for assumptions and simplifications. The findings were specific to the USA and do not appear to be transferable to other countries.

Concluding remarks:
The cost-effectiveness methods were robust and the authors’ conclusions appear to be valid.

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