The cost-effectiveness of symptom-based testing and routine screening for acute HIV infection in men who have sex with men in the USA

Juusola JL, Brandeau ML, Long EF, Owens DK, Bendavid E

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 aim was to examine the cost-effectiveness of strategies to detect and treat HIV in men who have sex with men, aged between 13 and 64 years, in the USA. The authors concluded that annual HIV antibody screening with 90% coverage was effective over 20 years, but the addition of symptom-based viral load testing was more effective and relatively inexpensive. The methods, analyses, and results were mostly clear, and the authors’ conclusions appear to be reasonable.

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

Study objective
The aim was to examine the cost-effectiveness of strategies to detect and treat HIV in men who have sex with men. The target population was men aged 13 to 64 years, which was the recommended age range for routine annual HIV screening in the USA.

Interventions
The strategies were symptom-based viral load testing for those with influenza-like illness, expanded HIV screening using antibody testing (90% coverage), and a combination of expanded antibody screening with symptom-based viral load testing. Viral load testing for all patients was also considered in combination with these strategies, which were compared with the usual annual antibody screening (67% coverage). In all cases, those who were found to be acutely infected were given antiretroviral therapy (ART).

Location/setting
USA/primary care.

Methods
Analytical approach:
A dynamic compartmental health-state transition model of HIV transmission and progression was developed to synthesise the published evidence and epidemiological data. The model was developed and calibrated using earlier HIV natural history models. The time horizon was 20 years and the authors' stated that the study perspective was societal.

Effectiveness data:
The key clinical outcome was the number of HIV infections prevented. Other intermediate endpoints were the transmission probability per male partnership and the reduction in infectivity with ART. Most of these estimates were from epidemiological and modelling reports.

Monetary benefit and utility valuations:
The utility estimates were from relevant published studies and they were adjusted to reflect the average age of the modelled cohort.

Measure of benefit:
The measures of benefit were the number of HIV infections prevented and quality-adjusted life-years (QALYs). These were discounted annually at 3%.
Cost data:
The direct medical costs included HIV testing, counselling and diagnosis, baseline medical care, HIV-related health care, and ART. The values were from published literature and the Centers for Medicare and Medicaid Services 2009 fee schedule. All costs were reported in 2009 US $ and future costs were discounted annually at 3%.

Analysis of uncertainty:
The model parameters for HIV testing, screening, and ART were varied in one-way and probabilistic sensitivity analyses. All the key parameters were varied over wide ranges. The results were presented in a table and an online appendix, which included cost-effectiveness acceptability curves and a cost-effectiveness acceptability frontier.

Results
Over 20 years, the total costs were $1,270 billion for normal screening, $1,272 billion for expanded screening, $1,276 billion for expanded screening and symptom-based viral load testing, and $1,283 billion for expanded screening and viral load testing (annual), plus symptom-based viral load testing. Testing made the largest contribution to costs (76 to 86%).

The total QALYs were 176.00 million for normal screening, 176.19 million for expanded screening, 176.32 million for expanded screening and symptom-based testing, and 176.39 million for expanded screening with viral load testing and symptom-based testing.

Compared with normal screening, the incremental cost per QALY gained was $12,582 for expanded screening, $20,013 for expanded screening and symptom-based testing, and $35,032 for expanded screening and annual testing plus symptom-based testing.

One-way sensitivity analyses showed that these results were stable to variations in most of the estimates, including potential over-testing from patients presenting with mild cold symptoms and modest increases in HIV-related deaths from early ART. The minimum HIV prevalence had to be 3% for symptom-based testing to remain below $50,000 per QALY.

The probabilistic sensitivity analysis showed that expanded screening was the preferred option at a willingness-to-pay (WTP) of less than $20,000 per QALY; expanded screening and symptom-based testing was preferred for thresholds between $20,000 and $80,000 per QALY; and expanded screening plus annual and symptom-based viral load testing was preferred for thresholds over $80,000 per QALY.

Authors’ conclusions
The authors concluded that for men who have sex with men, annual HIV antibody screening with 90% coverage could prevent 15,000 new infections over 20 years, but the addition of symptom-based viral load testing was more effective and relatively inexpensive.

CRD commentary
Interventions:
The strategies were well described. The expansion of HIV antibody testing to 90% coverage might be feasible and affordable in other settings, depending on issues, such as the patient and doctor communication, education, and health promotion activities.

Effectiveness/benefits:
The predicted clinical outcomes for the strategies appear to have been based on relevant epidemiological and observational studies, but no systematic search appears to have been undertaken to identify and select these studies, so it is unclear whether other relevant information was available. The utility values and methods used to estimate them were not described, but the references were given. The model was calibrated with national data, which strengthened its predictive ability. The authors implied that these methods were the best available, but the results should be viewed with caution due to great variations in the underlying sexual and health service use behaviours of men who have sex with men.

Costs:
The costing methods were briefly described. The unit costs were clearly presented and appear to have been reasonable and comprehensive. The perspective was stated to be societal, but it seems that a health provider perspective was adopted, as only the direct medical costs were analysed.

Analysis and results:
The model was described and a diagram was provided in an online appendix. An appropriate incremental approach was used to synthesise the costs and benefits of the alternative strategies. Sensitivity analyses were carried out to assess the uncertainty in the base-case findings and the results were clearly presented and discussed. Supplementary files demonstrated the stability of the main results to variations in the key parameters. The authors highlighted some limitations to their study and discussed broader feasibility and budget issues.

Concluding remarks:
The methods, analyses, and results were mostly clear and comprehensive. The conclusions reached by the authors appear to be a reasonable assessment of the study findings, but there was uncertainty around the assumptions made.

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