Expanded screening for HIV in the United States: an analysis of cost-effectiveness

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
Routine human immunodeficiency virus (HIV) counselling, testing and referral (HIVCTR) was compared with current practice. HIVCTR included the use of an enzyme-linked immunosorbent assay (ELISA) and same-day antibody test (rapid testing). Different scenarios with annual ELISA, single ELISA, ELISA every 3 years and ELISA every 5 years were compared.

Type of intervention
Diagnosis.

Economic study type
Cost-utility analysis.

Study population
The study population comprised the USA population with three different risks for HIV. The risks for HIV were defined as:

- high risk (3% of prevalence of undiagnosed HIV and 2% of annual incidence);
- the Centers for Disease Control and Prevention (CDC) threshold (1% of prevalence of undiagnosed HIV and 0.12% of annual incidence); and
- US general (0.1% of prevalence of undiagnosed HIV and 0.01% of annual incidence).

Setting
Although the setting was not explicitly stated, it appears to have been secondary care. The economic study was carried out in the USA.

Dates to which data relate
The effectiveness evidence was obtained from studies published between 1996 and 2003. The cost data were from a survey in 1992 and studies published between 1998 and 2002. The price year was 2001.

Source of effectiveness data
The clinical parameters included in the model were:

- the sensitivity and specificity;
- the test acceptance rate;
- the rate of HIV-infected return for test results and linkage to care;
the HIV-negative return rate; and

the efficacy of antiretroviral therapy.

The epidemiological parameter included in the model was the prevalence of the target population at various risks (high, CDC threshold and US general).

Modelling
The model included disease and screening components. A Monte Carlo, state-transition framework was applied to characterise disease progression between health states. The health states were defined by the CD4 cell count and HIV RNA level. A screening model was applied to convey information about detection, follow-up and linkage. The length of a cycle was 1 month and the time horizon was lifetime for the simulation.

Sources searched to identify primary studies
The clinical effectiveness data were obtained from six published studies and CDC reports. Details of these studies and reports were not reported.

Methods used to judge relevance and validity, and for extracting data
It was unclear whether a systematic review of the literature was undertaken to identify the primary studies. The authors did not specify the databases searched for relevant literature.

Measure of benefits used in the economic analysis
The summary benefit measure used was the number of quality-adjusted life-months (QALMs). These were derived using a modelling approach. In the synthesis the authors used the quality-adjusted life-years (QALYs) gained. The utility weights were obtained from three published US studies. The benefits were discounted at an annual rate of 3%.

Direct costs
The direct costs included in the analyses comprised the costs of the tests (rapid testing and ELISA) and confirmatory test (repeated duplicate tests and a Western blot analysis), and the cost of pre-test and post-test counselling for HIV-positive and -negative patients. The unit costs and the quantities of resource used were not reported separately. The costs were obtained from published literature. Discounting was relevant, as the long-term costs were evaluated, and an annual rate of 3% was applied. The price was adjusted to 2001.

Statistical analysis of costs
The costs were treated deterministically.

Indirect Costs
Productivity costs were not considered.

Currency
US dollars ($).

Sensitivity analysis
Univariate sensitivity analyses were performed. The results of the sensitivity analysis were presented graphically.
Estimated benefits used in the economic analysis

Compared with current practice, QALMs for the high-risk population were improved by using the strategies of current practice plus one-time ELISA (219.8 versus 220.74 months), current practice plus ELISA every 5 years (219.8 versus 222.78 months), current practice plus ELISA every 3 years (219.8 versus 223.46 months), and current practice plus annual ELISA (219.8 versus 224.29 months).

Compared with current practice, QALMs for the CDC threshold population were improved by using the strategies of current practice plus one-time ELISA (213.12 versus 215.28 months), current practice plus ELISA every 5 years (213.12 versus 216.93 months), current practice plus ELISA every 3 years (213.12 versus 217.60 months), and current practice plus annual ELISA (213.12 versus 218.76 months).

Compared with current practice, QALMs for the US general population were improved by using the strategies of current practice plus one-time ELISA (219.05 versus 220.81 months), current practice plus ELISA every 5 years (219.05 versus 222.73 months), current practice plus ELISA every 3 years (219.05 versus 222.87 months), and current practice plus annual ELISA (219.05 versus 224.23 months).

Cost results

The mean lifetime cost per person for the high-risk population was $78,100 with current practice, $80,700 with current practice plus one-time ELISA, $89,000 with current practice plus ELISA every 5 years, $92,500 with current practice plus ELISA every 3 years, and $98,600 with current practice plus annual ELISA.

The mean lifetime cost per person for the CDC threshold population was $77,700 with current practice, $83,500 with current practice plus one-time ELISA, $90,500 with current practice plus ELISA every 5 years, $93,800 with current practice plus ELISA every 3 years, and $99,900 with current practice plus annual ELISA.

The mean lifetime cost per person for the US general population was $75,400 with current practice, $80,200 with current practice plus one-time ELISA, $87,200 with current practice plus ELISA every 5 years, $90,600 with current practice plus ELISA every 3 years, and $96,800 with current practice plus annual ELISA.

Synthesis of costs and benefits

For the high-risk population, the costs per QALY gained were $36,000 with current practice plus one-time ELISA over current practice, $50,000 with current practice plus ELISA every 5 years over current practice, $63,000 with current practice plus ELISA every 3 years over current practice, and $100,000 with current practice plus annual ELISA over current practice.

For the CDC threshold population, the costs per QALY gained were $38,000 with current practice plus one-time ELISA over current practice, $71,000 with current practice plus ELISA every 5 years over current practice, $85,000 with current practice plus ELISA every 3 years over current practice, and $165,000 with current practice plus annual ELISA over current practice.

For the US general population, the costs per QALY gained were $113,000 with current practice plus one-time ELISA over current practice, $169,000 with current practice plus ELISA every 5 years over current practice, $1,002,000 with current practice plus ELISA every 3 years over current practice, and $1,264,000 with current practice plus annual ELISA over current practice.

Authors' conclusions

Routine voluntary screening for the human immunodeficiency virus (HIV) every 3 to 5 years was effective and cost-effective, except in populations with the lowest prevalence of HIV. One-time screening in the setting of the general population might also be cost-effective.
The strategies compared were reported clearly and included current practice plus ELISA.

**Validity of estimate of measure of effectiveness**

The effectiveness data were derived from the literature. Neither the sources searched to identify the primary studies nor the characteristics of the studies retrieved were reported. It was unclear if a systematic review of literature had been carried out to retrieve the model input parameters.

**Validity of estimate of measure of benefit**

The use of QALYs as the measure of benefit in the economic analysis seems to have been appropriate. Discounting was performed.

**Validity of estimate of costs**

The sources of the cost data and resource use were well reported, along with cost adjustments, including both the price year and discounting. Although a breakdown of the unit cost was not provided, the level of reporting was sufficiently transparent to allow the reader to ascertain what resources had been included in the cost estimates. The productivity costs were not included although the authors stated that a societal perspective had been adopted in the economic analysis.

**Other issues**

The authors did not compare their results with those from other studies. The issue of generalisability was not addressed. The authors did not present their results selectively and their conclusions reflected the scope of the analysis.

**Implications of the study**

The authors suggested that this study supports those strategies that expanded existing national guidelines screening for HIV.

**Source of funding**

Supported by grants from the National Institute of Mental Health, the National Institute of Allergy and Infectious Diseases, the National Institute on Drug Abuse, and the Centers for Disease Control and Prevention.

**Bibliographic details**


**PubMedID**

15703423

**DOI**

10.1056/NEJMsa042088

**Other publications of related interest**

Because readers are likely to encounter and assess individual publications, NHS EED abstracts reflect the original publication as it is written, as a stand-alone paper. Where NHS EED abstractors are able to identify positively that a publication is significantly linked to or informed by other publications, these will be referenced in the text of the abstract and their bibliographic details recorded here for information.


Indexing Status
Subject indexing assigned by NLM

MeSH
Anti-Retroviral Agents /economics; Antiretroviral Therapy, Highly Active /economics; Computer Simulation; Cost-Benefit Analysis; Disease Progression; Enzyme-Linked Immunosorbent Assay /economics; HIV Antibodies /blood; HIV Infections /diagnosis /drug therapy /economics /transmission; Health Care Costs; Humans; Mass Screening /economics; Monte Carlo Method; Quality-Adjusted Life Years; Risk Factors; United States

AccessionNumber
22005008058

Date bibliographic record published
31/12/2007

Date abstract record published
31/12/2007