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
The use of expanded antenatal screening for human immunodeficiency virus (HIV). In addition to voluntary screening in early pregnancy, this study examines the use of repeat testing in late pregnancy, and partner testing in women who tested HIV-negative in early pregnancy, in order to find mothers who have acquired HIV in late pregnancy or while they are breast-feeding. Both universal and selective screening programmes were considered. Four scenarios were tested:

universal repeat testing (i.e., a second test in late pregnancy), assuming that seropositive women would take up all measures (antiretroviral treatment, Caesarean section and not breast-feeding) to reduce the risk of transmitting HIV to their baby;

universal partner testing (one partner per mother) in early pregnancy, at the same time as the woman's initial test;

selective repeat screening of mothers considered to be high-risk, assuming the uptake of all three preventative measures; and

selective partner screening of partners considered to be high-risk, at the same time as the mother's initial test.

Type of intervention
Screening.

Economic study type
Cost-effectiveness analysis

Study population
The study population comprised pregnant women in London with an increased risk of HIV infection. This included injecting drug users, women from areas with a high prevalence of HIV, women who have recently contracted another sexually transmitted infection, and women whose partners have one of these three characteristics.

Setting
The setting was not explicitly stated. This study was presumably set in the maternity units of secondary care institutions, alongside the current antenatal screening programme. The economic study was carried out in London, UK.

Dates to which data relate

Source of effectiveness data
The effectiveness data were derived from a synthesis of completed studies.
Modelling
A published decision model was used to estimate the testing and future HIV treatment costs and the health benefits. A model was also used to estimate the lifetime cost of treating HIV-positive children and adults, using differential costs according to disease stage.

Outcomes assessed in the review
The outcomes assessed in the review included:
the health benefit (life-years gained) of preventing a vertical transmission and a secondary transmission;
the probabilities of vertical transmission, with and without the uptake of preventative measures; and
the prevalence of vertical transmission among women who were seronegative in early pregnancy.

Study designs and other criteria for inclusion in the review
Not stated.

Sources searched to identify primary studies
Not stated.

Criteria used to ensure the validity of primary studies
Not stated.

Methods used to judge relevance and validity, and for extracting data
Not stated.

Number of primary studies included
Eight studies were included in the review.

Methods of combining primary studies
Not stated.

Investigation of differences between primary studies
For the most part, the authors do not discuss differences between the primary studies. However, French data on the prevalence of HIV and incidence of vertical transmission in women, in Paris, who were seronegative in early pregnancy, were adjusted for application to London.

Results of the review
The prevention of a vertical transmission resulted in a gain of 14.4 discounted life-years for a child (70 years discounted at 5% annually).

The prevention of transmission from the partner to the mother resulted in a gain of 6.4 discounted life-years (30 years discounted at 5% annually).

Without preventative measures, there was a 14% probability of vertical transmission during lactation, and an 18%
probability during pregnancy and (vaginal) delivery. Combining these two probabilities on the assumption of independent probabilities, the overall probability was 29%. This was reduced to 6% with preventive measures.

Adjusting Paris data to the London prevalence, up to 7 babies may acquire HIV from their mothers per 100,000 seronegative early pregnancies.

**Methods used to derive estimates of effectiveness**
The authors made some assumptions in order to populate the model.

**Estimates of effectiveness and key assumptions**
The detection of HIV in an adult was assumed to result in one discounted life-year gained due to the earlier commencement of antiretroviral therapy. The probability of vertical transmission for a woman who becomes infected during pregnancy was the same as the general probability of transmission (29%). It was assumed that the interventions avert at least one vertical transmission per 100,000 seronegative early pregnancies. Each vertical transmission averted due to the testing of partners was assumed to be associated with 4.3 maternal infections avoided.

**Measure of benefits used in the economic analysis**
The health benefit measure used was the life-years gained.

**Direct costs**
The costs included were those of the test, pre- and post-test counselling, antiretroviral prophylaxis during delivery and for the baby, delivery (vaginal or Caesarean), breast-milk substitution, and the lifetime costs of HIV treatment (for children and adults) as health service costs. Many of these costs were obtained from a single paper. A model was used to estimate the lifetime cost of treating HIV-positive children and adults, using differential costs according to the disease stage. The marginal cost of the test itself was used as a lower bound for the range of testing costs (defined as counselling plus testing costs). The future costs were discounted at a baseline annual rate of 5%. The costs were reported in 1995/96 values.

**Indirect costs**
The authors state that the indirect costs were excluded from the analysis.

**Currency**
UK pounds sterling ({}).

**Sensitivity analysis**
Sensitivity analyses were conducted on several parameters. The testing cost (i.e. test plus counselling) was analysed to account for expected economies of scale due to the universal early pregnancy-testing programme. The discount rate and the decision whether to discount future life-years gained were analysed due to professional uncertainty about analytical methods. Analyses were also conducted of the duration of the various HIV disease stages, the health gain from initiating antiretroviral treatment earlier than had there not been expanded testing, and the costs of treating HIV, in order to account for general variability in the data. One-way simple analyses and threshold analyses were carried out. In some cases, the ranges were derived from the literature.

**Estimated benefits used in the economic analysis**
The cost-effectiveness results were presented for between one and five vertical transmissions avoided per 100,000 seronegative early pregnancies.
Cost results
Pre-test counselling and testing was estimated to cost from 4 to 40 (400,000 - 4,000,000 per 100,000 seronegative early pregnancies).

Synthesis of costs and benefits
With testing costs in the lower range (4 to 10) and at least 2 vertical transmissions avoided out of 100,000 seronegative early pregnancies, the incremental cost-effectiveness of universal and selective expanded testing will be less than 10,000 per life-year gained. Selective testing was more cost-effective, with similar ratios obtained when testing costs were higher (10 to 40) and only one transmission per 100,000 seronegative early pregnancies avoided.

The results were sensitive to the testing cost. However, partner testing was cost-effective over the whole range of sensitivity analyses (4,700 was the maximum cost per life-year gained), and was cost-saving in many scenarios. Repeat testing was less cost-effective in the baseline scenario, except when the marginal cost of counselling was very low.

Authors' conclusions
Expanded antenatal screening for human immunodeficiency virus (HIV) should be considered given the favourable findings of this cost-effectiveness analysis.

CRD COMMENTARY - Selection of comparators
The comparator of voluntary universal HIV testing in early pregnancy is current practice in the NHS and, as such, provides a useful comparator.

Validity of estimate of measure of effectiveness
The authors do not state that a systematic review of the literature was carried out to populate the model. They also do not state how they combined the data from different studies.

Validity of estimate of measure of benefit
The benefits were modelled and measured in the life-years gained. The authors also report their findings of HIV infections averted to allow for comparisons with other studies.

Validity of estimate of costs
All costs relevant to the perspective of the NHS were included in this analysis. The unit costs were reported separately, with an explanation of their derivation when necessary (for example, for the lifetime costs). The resource use quantities were derived from the model. Sensitivity analyses were carried out on some of the unit costs. The price date was reported.

Other issues
In this study, the cost-effectiveness ratios were presented under a range of scenarios, including ones concerning the number of vertical transmissions avoided among seronegative early pregnancies. The authors do not report the expected number of vertical transmissions avoided, though presumably the model could have been adapted to generate this. It would have been interesting to have an idea of the likelihood of the scenarios presented in this study.

Although not specifically stated, the testing programme considered in the study was conducted on a voluntary basis. The costs and the benefits of a voluntary programme may not be generalisable to a compulsory programme, and vice-versa.

The authors made helpful comparisons of this study's findings with general HIV prevention programmes in the USA.
After currency conversions, they conclude that expanded testing in London is at least as cost-effective as these programmes. The authors present the results of the sensitivity analyses "on the most relevant assumptions", suggesting that not all of the results are presented.

**Implications of the study**

The authors recommend the implementation of an expanded antenatal HIV screening programme in London, which could be comprised of a combination of the repeat and partner testing approaches.

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None stated.

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**Other publications of related interest**


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