Universal HIV screening of pregnant women in England: cost effectiveness analysis

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 study examined the universal and voluntary screening of pregnant women for human immunodeficiency virus (HIV), and the treatment of human HIV-infected women and their infants with zidovudine.

Type of intervention
Primary and secondary prevention.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised pregnant mothers who were unaware of their HIV status. Women who requested an HIV test were excluded.

Setting
The setting was primary care. The economic analysis was carried out in the Netherlands.

Dates to which data relate
The effectiveness data were obtained from studies published in 1992 and 1994. The resource use data were derived from published data collected between 1986 and 1996. The prices were reported to have been from 1995 to 1996.

Source of effectiveness data
The effectiveness data were derived from a review of the literature.

Modelling
A staged, progression of disease model was developed to estimate the cost-effectiveness of universal, voluntary HIV screening of pregnant women. The four clinical stages of HIV infection considered were indeterminate, asymptomatic, symptomatic non-acquired immune deficiency syndrome (AIDS) and AIDS. The duration of stay within each clinical stage was assumed to be exponentially distributed.

Outcomes assessed in the review
The outcomes assessed in the review and used as model inputs were:

the prevalence of HIV-positive mothers;

the probability of mother to child transmission for breast-feeding;
the probabilities of mother to child transmission during pregnancy and vaginal delivery or Caesarean delivery, with zidovudine treatment; and

the probabilities of mother to child transmission during pregnancy and vaginal delivery or Caesarean delivery, without zidovudine treatment.

**Study designs and other criteria for inclusion in the review**
This was a non-systematic review of the literature. The inclusion and exclusion criteria were not given.

**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**
Three published studies were included in the review.

**Methods of combining primary studies**
The estimates from primary studies were combined using a narrative method.

**Investigation of differences between primary studies**
Not stated.

**Results of the review**
The probabilities for mother to child transmission were:

- 14% for breast-feeding,
- 18% during pregnancy and vaginal delivery without zidovudine treatment,
- 10% during pregnancy and Caesarean delivery without zidovudine treatment, and
- 8% during pregnancy and vaginal delivery with zidovudine treatment.

In the absence of preventive measures, the probability of mother to child transmission was 29%. This decreased to 23% if a Caesarean section was performed, and to 6% if all preventive measures were implemented.

**Methods used to derive estimates of effectiveness**
The authors made assumptions to derive other estimates of effectiveness.

**Estimates of effectiveness and key assumptions**
A 6% transmission rate was assumed for zidovudine treatment and a Caesarean delivery. Independent probabilities were
assumed for breast-feeding and delivery. The uptake of zidovudine among HIV-positive pregnant women was assumed to be 75%. Forty per cent of the deliveries in HIV-positive women were assumed to be elective Caesarean sections.

**Measure of benefits used in the economic analysis**
The measure of benefits was the life-years gained (LYG). The benefits were measured in terms of LYG among children in whom infection with HIV was averted and in LYG because of earlier antiretroviral treatment of the mothers. Little information was given on how the LYG were calculated. It seems that they have been calculated by combining the difference in mother and child HIV cases (derived from data found in the review) with the assumed LYG per child and mother. In the base-case, a mother was assumed to gain one year and a child 70 years from detection and treatment. Discounted (at 5%) and non-discounted LYG were estimated.

**Direct costs**
The cost/resource boundary of the analysis is likely to have been that of the hospital. The direct costs were for screening (test plus pre-test counselling), post-test counselling, zidovudine treatment of the mother and newborn, vaginal delivery, elective and emergency Caesarean delivery, formula feeding, and the lifetime costs of hospital and community care for a child infected with HIV. The unit costs were reported. Resource estimates were calculated using published data obtained from a London hospital between 1986 and 1996. The costs were estimated for the 1993 to 1994 financial year and indexed to 1995 to 1996 prices. The costs were discounted at 5%.

**Statistical analysis of costs**
No statistical analysis of the costs was carried out.

**Indirect Costs**
No indirect costs were included in the analysis.

**Currency**
UK pounds sterling (£).

**Sensitivity analysis**
One-way sensitivity analyses were carried out. The variables investigated were the discount rate (3 or 7%), number of LYG (0 or 2), uptake of the intervention (low or high), and the lifetime cost of caring for an HIV-infected child (75 or 125% of the costs of the reference case). The interventions considered were zidovudine treatment (60, 90%), elective Caesarean section (20, 60%) and formula feeding (80, 100%).

**Estimated benefits used in the economic analysis**
The total number of LYG gained with universal, voluntary HIV screening of pregnant women was not reported.

**Cost results**
The net cost comprised the total costs of antenatal screening minus the screening benefits of averted health care for children infected with HIV.

The total cost of antenatal screening was not reported. The lifetime medical and social care cost of childhood HIV infection was 178,300.

**Synthesis of costs and benefits**
For the reference case, where the prevalence was 1 per 10,000 pregnancies and screening cost 40, the net cost per LYG
of antenatal screening was 114,400. It was 7,300 when the screening cost was 4.

If the prevalence of HIV-positive women was 15 per 10,000 pregnancies and screening cost 40, the net cost per LYG of antenatal screening was 3,300. Antenatal screening was cost-saving when screening cost 4.

The net cost per LYG was 10,200 when the prevalence was 5 per 10,000 pregnancies and screening cost 25.

Major improvements were found when the discount rate was lowered to 3%, when the LYG were not discounted, and when there was a high lifetime cost of paediatric HIV care.

Authors' conclusions
Universal, voluntary antenatal screening for human immunodeficiency virus (HIV) was estimated to be a cost-effective intervention, with cost-saving potential in areas in which there is a high prevalence of HIV infection among pregnant women. In areas with lower prevalence rates, the cost-effectiveness could be well below 20,000 per life-year gained (LYG), and universal, voluntary antenatal screening could be considered.

CRD COMMENTARY - Selection of comparators
The reason for the choice of the comparator (no screening) was clear.

Validity of estimate of measure of effectiveness
The internal validity of the estimates of benefit cannot be objectively assessed due to the lack of a comprehensive review of the literature review. Also, because there was no quality assessment of the primary studies included in the review. However, uncertainties in the main parameters were comprehensively explored in the sensitivity analyses, with the exception of the strong assumption of 100% screening compliance in women.

Validity of estimate of measure of benefit
The estimation of the benefits was modelled. The measure of benefit included the number of LYG among children and among women. However, the total number of LYG was not reported and this may limit the relevance of the cost-effectiveness analysis.

Validity of estimate of costs
The perspective adopted was unclear, but it was likely to have been that of the hospital. No important cost items were omitted. Although the costs of terminating a pregnancy for reasons related to HIV were omitted, these are unlikely to have affected the authors’ conclusions. The costs and the quantities were not reported separately. The price year was reported and the direct costs were discounted. The total costs of screening and no screening were not reported. This limits the usefulness of the analysis.

Other issues
The authors made appropriate comparisons of their findings with those from other studies. The issue of generalisability to other regions in England was addressed. The authors reported further limitations to their study. For example, combination therapy, indirect costs, psychological factors and lower screening compliance rates were not included in the model. The main limitation of the study was the poor reporting of the results.

Implications of the study
The introduction of universal, voluntary antenatal screening needs to be considered since the incidence of mother to child transmission of HIV can be reduced successfully. More detailed information is needed to further develop assessments of cost-effectiveness.
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Other publications of related interest


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