Farmaco-economische evaluatie van universele HIV-screening in de zwangerschap: een kosteneffectiviteitsanalyse voor Amsterdam [Pharmaco-economic evaluation of universal HIV-screening of pregnant women: a cost-effectiveness analysis for Amsterdam]

**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**
Universal HIV-screening with an ELISA-test and a Western blot-test.

**Type of intervention**
Screening.

**Economic study type**
Cost-effectiveness analysis.

**Study population**
The study population consisted of hypothetical pregnant women in Amsterdam.

**Setting**
The study setting was hospitals and an obstetrical practice in Amsterdam.

**Dates to which data relate**
The literature reviewed dated from 1992-1999. The year for statistical data was not specified. Resource use and cost data related to 1998 values.

**Source of effectiveness data**
Effectiveness data were derived from a literature review and statistical data from the Dutch Bureau of Statistics (CBS). No sources were mentioned for estimates of the sensitivity and specificity of the tests. No sources were mentioned for estimates of the possibility of a caesarean section for unscreened pregnant women.

**Outcomes assessed in the review**
Data were derived from various sources. The outcomes assessed in the review were:

- prevalence of HIV among pregnant women in Amsterdam;
- chance of HIV-transmission from mother to child;
- survival rate of an infected child for an undiagnosed HIV-infected mother without screening and with screening;
- life-years lost due to HIV (equal to the remaining life expectancy).
Study designs and other criteria for inclusion in the review
No details were provided.

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
Four primary studies were included in the review.

Methods of combining primary studies
Not stated.

Investigation of differences between primary studies
Not stated.

Results of the review
The results of the review were as follows:

Prevalence of HIV among pregnant women in Amsterdam: between 5 and 15 per 10,000 women.

Chance of HIV-transmission from mother to child: 19% (95% CI: 18 - 20) for transmission during pregnancy without pharmacotherapy and natural delivery; 10.4% (95% CI: 7.8 - 13) for pregnancy without pharmacotherapy with caesarean section; 2.0% (95% CI: 0.1 - 4) for pregnancy with pharmacotherapy and caesarean section; and 14% (95% CI: 7.0 - 22) during breast feeding.

Survival rate of an infected child for an undiagnosed HIV-infected mother without screening: 18 years; and with screening: 20 years.

Life-years lost due to HIV (equal to the remaining life expectancy): 60.5 years for an infected child for an undiagnosed HIV-infected mother without screening, and 58.5 years with screening.

Sensitivity of the ELISA-test was set at 100% and the specificity at 99%.

In case of a positive result a confirmation-ELISA was performed; and after two positive ELISA's a western blot-test was performed. For the total test procedure sensitivity and specificity were set at 100%.

The possibility of a caesarean section was set at 10% for unscreened pregnant women.

Measure of benefits used in the economic analysis
Life years gained was used as the measure of benefits.
Direct costs
Costs of the ELISA-test were based on data from the Dutch Health Care Council (Ziekenfondsraad, 1997). Costs for education about screening were based on Dutch statistics (CBS) and estimates by the authors. Costs of pharmacotherapy during pregnancy were based on data from the Dutch Health Care Council (Ziekenfondsraad, 1998).

Costs of a caesarean section, normal ambulatory delivery, care in a hospital per day as well as the average days spent in hospital were based on the literature.

Costs of care and treatment for HIV-infected children were based on UK studies.

All costs were estimates based on 1998 prices; for these calculations specific deflation-percentages for health care from the Dutch ministry of health were used.

Prices used were without VAT.

Statistical analysis of costs
No statistical analysis was reported.

Indirect Costs
Indirect costs were not assessed.

Currency
Dutch guilders (Dfl).

Sensitivity analysis
Sensitivity analyses were performed varying the screening costs per pregnant woman (test procedure and education), the effectiveness of preventative interventions; discounting life years gained (LYG) at 4%, and a 50% reduction in compliance and acceptance of caesarean section.

Estimated benefits used in the economic analysis
Health care gains: 80 LYG with a prevalence of 5 undiagnosed HIV-infections per 10,000 pregnant women; and 241 LYG with a prevalence of 15 per 10,000.

Cost results
The cost results were as follows:

Costs of the total test procedure: Dfl 12.50 per pregnant women.

Universal education was estimated at Dfl 2.50; and costs for education after a positive test was estimated at Dfl 15.50.

Costs of pharmacotherapy during pregnancy were estimated at Dfl 9,545.

Expected additional costs of caesarean section with HIV-screening: Dfl 4,750. The total costs of a caesarean section were Dfl 6,030 (caesarean section Dfl 1,960 + care in a hospital per day f668 for an average of 6.1 days); costs of a normal ambulatory delivery were Dfl 750; and the possibility of a caesarean section for unscreened pregnant women was set at 10% (0.9 x (6,030-750) = 4,750).

Expected additional costs of bottle-feeding instead of breastfeeding were estimated as Dfl 450.

Costs of life-long care and treatment for HIV-infected children were estimated to be in the range Dfl 100,000 - Dfl
500,000 (discounted at 4%).

**Synthesis of costs and benefits**

Net costs: difference between investment costs of the programme (testing, pharmacotherapy for mother and child, caesarean section and bottle-feeding) and the financial benefits of the programme (preventing HIV/AIDS care for infected children).

No screening, i.e. 90% breastfeeding and natural delivery, was compared to screening, i.e. screening and pharmacotherapy, caesarean section and bottle-feeding for all seropositive pregnant women (100% compliance and acceptance of caesarean section and bottle-feeding).

The cost-effectiveness ratio was net costs per LYG. LYG were not discounted in the basic assessment (only in sensitivity analyses).

1. Prevalence of 5 undiagnosed HIV-infections per 10,000 pregnant women:

   Investment costs: Dfl 225,000; financial benefits: Dfl 132,000 (assuming life long care costs of Dfl 100,000)/Dfl 661,000 (assuming life long care costs of Dfl 500,000); Net costs: Dfl 93,000 (assuming life long care costs of Dfl 100,000)/Dfl 436,000 (assuming life long care costs of Dfl 500,000). Break-even point for life-long care (net costs are Dfl 0): Dfl 171,000.

2. Prevalence of 10 undiagnosed HIV-infections per 10,000 pregnant women:

   Investment costs: Dfl 301,000; financial benefits: Dfl 265,000/Dfl 1,323,000; Net costs: Dfl 36,000/Dfl 1,022,000. Break-even point for life-long care: Dfl 114,000.

3. Prevalence of 15 undiagnosed HIV-infections per 10,000 pregnant women:

   Investment costs: Dfl 376,000; financial benefits: Dfl 397,000/Dfl 1,984,000; Net costs: Dfl -20,000/Dfl -1,608,000. Break-even point for life-long care: Dfl 95,000

   If the life-long costs for care are Dfl 100,000, the net costs per LYG are Dfl 225 (prevalence of 10 per 10,000 pregnancies) or Dfl 1,160 (prevalence of 5 per 10,000 pregnancies).

Sensitivity analyses:

1. Doubling the screening costs per pregnant woman (test procedure and education), assuming a prevalence of 10 undiagnosed HIV-infections per 10,000 pregnancies and life-long care costs for HIV-infected children of Dfl 100,000: Net costs per LYG: Dfl 994 (compared with Dfl 225).

2. More conservative estimates for the effectiveness of preventative interventions (using the lower boundary of the CI for transmission-chances without pharmacotherapy, caesarean section and bottle-feeding, and the upper boundary of the CI for transmission-chances with these interventions): Net costs per LYG: Dfl 1,050 (compared with Dfl 225).

3. Discounting LYG at 4%: Net costs per LYG: Dfl 1,160 (compared with Dfl 225).

4. A 50% reduction in compliance and acceptance of caesarean section: Net costs per LYG: Dfl 1,050 (compared with Dfl 225).

In all sensitivity scenario's HIV-screening would be cost-effective if the life-long care costs for an HIV-infected child were more than Dfl 164,000.

**Authors' conclusions**

Universal HIV screening of pregnant women in Amsterdam showed a favourable cost-effectiveness. The calculations
indicated a possibility of reducing costs.

**CRD COMMENTARY - Selection of comparators**
The comparator of no screening was appropriate and allowed the relative costs and benefits of the intervention to be assessed.

**Validity of estimate of measure of effectiveness**
It is difficult to objectively assess the validity of the estimates of effectiveness, as some were derived from a review of the literature, for which no details of the search strategy and inclusion criteria were provided, and the assumptions for the sensitivity and specificity of the test procedure. However, the authors did mitigate this to some degree by the sensitivity analyses that were undertaken to address variability in their estimates.

**Validity of estimate of measure of benefit**
The benefit measure was appropriate and was derived directly from the effectiveness estimates.

**Validity of estimate of costs**
The authors adopted thorough and progressive techniques in their cost analysis, for example in the adoption of discounting for future costs (and for LYG in the sensitivity analyses) they included price years and adjustments for inflation, and listed costs for all relevant interventions, treatments and tests. Appropriate sensitivity analyses were also undertaken to account for variability in the estimates used in the calculations.

**Other issues**
The authors pointed out several simplifications in their pharmacoeconomic model: abortions due to HIV-infection were not taken into account; however this will occur infrequently and the cost implications will be minimal. Only direct costs were taken into account; taking indirect costs, both for mother and partner(s), into account would have a positive effect on cost-effectiveness. Possible long-term complications of the combination therapy for non-infected children are unclear, but will have negative effects on cost-effectiveness.

For comparison the authors stated that the estimated life-long costs of care for HIV-infected children in the UK are 178,000 (5% discount rate), which is equal to Dfl 500,000 (4% discount rate). The most recent Dutch estimate for the costs of life-long care for an HIV-infected adult is Dfl 130,000. Research in the UK showed that the costs of life-long care for an HIV-infected child is almost double the costs for an HIV-infected adult, making it likely that the costs of life-long care for an HIV-infected child are more than Dfl 200,000; which was cost-effective in all sensitivity scenario's.

**Implications of the study**
The research implications are that research should focus on estimating the costs of life-long care for HIV-infected children.

The clinical implications are that from a pharmacoeconomic perspective it is advisable to introduce a universal HIV-screening programme in Amsterdam.

**Source of funding**
None stated.

**Bibliographic details**

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