Routine prenatal screening for HIV in a low-prevalence setting

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 routine prenatal screening for human immunodeficiency virus (HIV) transmission, as recommended by the British Colombia (BC) Centre for Disease Control. Screening was offered to all pregnant women as part of prenatal care. The screening programme comprised pre- and post-test counselling. Zidovudine treatment was offered to infected mother-infant pairs.

Type of intervention
Screening and treatment.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised pregnant women at risk for HIV.

Setting
The setting was secondary care. The economic study was carried out in Canada.

Dates to which data relate
The effectiveness and resource use data were gathered in 1995 and 1996. Studies published between 1992 and 1995 were also used to derive some effectiveness estimates. The price year was not reported.

Source of effectiveness data
The effectiveness evidence was derived from a single study, a review of completed studies, and authors’ assumptions.

Link between effectiveness and cost data
The costing was carried out retrospectively on the same sample of patients as that included in the analysis of the effectiveness.

Study sample
Power calculations to determine the sample size were not performed. A sample of eligible women admitted to the BC Women's Hospital during one week in November 1995 and one week in November 1996 was identified to determine changes in physician behaviour. There were 145 women in the 1995 group and 121 women in the 1996 group. The database of the BC Provincial Laboratory was searched to assess the number of tests requested during the 6 months before and after June 1994 (when the new guidelines were first implemented). In addition, the Information and Analysis Branch of the BC Ministry of Health was also searched for pregnancy and birth statistics for 1995 and 1996.
Study design
This was a retrospective comparative study with historical controls. A simple historical case series was carried out to identify some data. The study was carried out both at the BC Women's Hospital and the Provincial Laboratory. Women were followed, but the length of and loss to follow-up were not explicitly reported. Children were followed up to 6 months of age.

Analysis of effectiveness
The outcomes estimated from the sample of women in 1995 and 1996 (one week in November) were:

- the proportion of patients with whom HIV testing was discussed,
- the proportion of HIV testing performed,
- the percentage of physicians who performed the delivery,
- the proportion of screening for HIV infections prescribed by physicians or obstetricians, and
- the proportion of primiparous and multiparous women offered HIV screening.

The number of tests requested during the 6 months before and after June 1994 was estimated. The aggregated data of the 1995 and 1996 numbers of pregnancies, pregnancies terminated, spontaneous abortions or ectopic pregnancies, stillbirths, and pregnancies carried to term in the whole BC sample were estimated. The numbers of pregnancies, pregnancies terminated, spontaneous abortions or ectopic pregnancies, stillbirths, pregnancies carried to term, HIV-infected infants, and rate of compliance with oral therapy were also estimated in the sub-groups of HIV-positive women identified through screening or prior care. The comparability of the two groups in each database search was not discussed.

Effectiveness results
The proportion of patients with whom HIV testing was discussed was 43% in the 1995 group (not discussed, 5%; data not documented, 52%) and 67% in the 1996 group (not discussed, 3%; data not documented, 30%), (p<0.001).

The proportion of HIV testing was 54% (not tested, 8%; data not documented, 37%) in the 1995 group and 76% (not tested, 8%; data not documented, 16%) in the 1996 group, (p<0.001).

Family physicians performed 55% of the deliveries. In 1995, 67% of physicians prescribed screenings for HIV infections versus 34% of obstetricians, (p<0.001). The corresponding figures in 1996 were 67% (physicians) and 87% (obstetricians), respectively, (p<0.001).

In 1995, 68% of primiparous women and 42% of multiparous women were offered HIV screening, (p<0.002). This increased to 77% each in 1996.

The number of tests requested per month was 8,100 during the 6 months before June 1994 and 9,171 after June 1994. There was an overall increase of 13.2% in test volume.

In the whole sample, there were 135,681 pregnancies, 30,021 terminated pregnancies, 12,377 spontaneous abortions or ectopic pregnancies, 638 stillbirths, and 92,645 pregnancies carried to term.

In the sub-group of HIV-positive women, there were 25 pregnancies in those identified HIV-positive through screening and 17 pregnancies in those identified through prior care. Among the HIV-positive women identified through screening, 10 pregnancies were terminated, there was 1 spontaneous abortion or ectopic pregnancy and 1 stillbirth, and 13 pregnancies were carried to term (1 HIV-infected infants). Among the HIV-positive women identified through prior care, 3 pregnancies were terminated, there was 1 spontaneous abortion or ectopic pregnancy and 0 stillbirths, and 13 pregnancies were carried to term (2 HIV-infected infants).
Among the 26 pregnancies carried to term in infected women, only 3 mothers took no zidovudine therapy for themselves and 2 declined it for their infected infants.

The mean rate of compliance with oral therapy was 69% in the 19 women available for evaluation.

**Clinical conclusions**
The effectiveness analysis showed that more screening tests and counselling were performed after the implementation of the programme. This permitted the identification of more HIV-infected mothers who would otherwise have been missed.

**Outcomes assessed in the review**
The outcomes estimated from published studies were prevalence of seropositivity and the rate of vertical HIV transmission.

**Study designs and other criteria for inclusion in the review**
A review of the literature was not undertaken. The design of the primary studies was not described.

**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**
The effectiveness estimates were derived from four primary studies.

**Methods of combining primary studies**
Not stated.

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

**Results of the review**
The prevalence of seropositivity was 0.27 per 1,000 in 1989, 0.50 per 1,000 in 1992, and 0.34 per 1,000 in 1994. The rate of vertical HIV transmission in the absence of the intervention was 25%.

**Methods used to derive estimates of effectiveness**
The authors made an assumption in order to calculate the expected number of pregnancies among HIV-positive women.

**Estimates of effectiveness and key assumptions**
It was assumed that the seroprevalence rate among pregnant women was 0.37 per 1,000.

**Measure of benefits used in the economic analysis**
Both the expected and unidentified numbers of pregnancies, terminated pregnancies, spontaneous abortions or ectopic pregnancies, stillbirths, pregnancies carried to term, and HIV-infected (and uninfected) infants were calculated by combining data from three sources (single study, published studies, and assumptions). These measures were used to identify the benefits of the screening programme versus no screening. The estimated reduction in the number of HIV-infected infants was also calculated and used as the summary benefit measure in the economic analysis.

**Direct costs**
The lifetime costs were discounted at an annual rate of 5%. The unit costs and the quantities of resources used were not presented separately. The health services included in the economic evaluation were the screening programme (such as labour, materials and overheads) and zidovudine treatment. The savings associated with the fewer resources spent on lifetime treatment of HIV-infected infants were also estimated. The cost/resource boundary of the study was not stated. The costs were estimated using data coming from the virology laboratory and from a literature review. The resource use data were estimated from data derived from the effectiveness study in 1995 and 1996. The price year was not reported.

**Statistical analysis of costs**
The costs were treated deterministically.

**Indirect Costs**
The indirect costs were not considered.

**Currency**
Canadian dollars (Can$).

**Sensitivity analysis**
A threshold analysis was carried out to test the robustness of the estimated cost-savings to variations in the lifetime cost of care, programme costs, the number of infections prevented and the discount rate. No justification for the ranges used in the analysis was provided.

**Estimated benefits used in the economic analysis**
There were 50.2 expected pregnancies, 11.1 expected terminated pregnancies, 4.6 expected spontaneous abortions or ectopic pregnancies, 0.2 expected stillbirths, 34.3 expected pregnancies carried to term, and 8.6 expected HIV-infected infants.

There were 8.2 unidentified pregnancies, 1.8 unidentified terminated pregnancies, 0.8 unidentified spontaneous abortions or ectopic pregnancies, 0 unidentified stillbirths, 5.6 unidentified pregnancies carried to term, and 1.4 unidentified HIV-infected infants.

The estimated reduction in the number of HIV-infected infants due to the screening programme was 2.2 cases.

**Cost results**
The total programme costs (screening and treatment) were Can$319,972.

The lifetime cost of care for an HIV-infected infant was Can$220,708.
As 2.2 cases of HIV-infected infants were avoided, the net savings of the programme were Can$165,586.

Synthesis of costs and benefits
The costs and benefits were not combined since the screening programme led to more benefits (fewer cases of HIV-infected infants) and less costs than the no screening strategy. The sensitivity analysis showed that the break-even point on the costs and savings of the programme would occur if the lifetime cost of HIV care were reduced to Can$145,000, the programme costs over 2 years were increased to Can$486,000, or the number of infections prevented were reduced to 1.4 over 2 years.

Authors' conclusions
The implementation of human immunodeficiency virus (HIV) screening during pregnancy was effective in reducing the rate of vertical transmission of HIV to infants. Pregnant women accepted the screening programme and it compared favourably with the cost-effectiveness of other health care interventions.

CRD COMMENTARY - Selection of comparators
The rationale for the choice of the comparator (no screening programme) was clear, as the main aim of the study was to assess the active value of the screening programme. You should decide whether it represents a valid comparator in your own setting.

Validity of estimate of measure of effectiveness
The effectiveness estimates were derived from several sources. Official statistics, as well as data from a retrospective review, were used. This represents a relative weakness. The use of a prospective trial would have produced more reliable estimates. The study sample in the single study element is likely to have been representative of the study population since an unselected group of women was used. Some assumptions were also made and some published data were used. However, the studies were selectively identified and a formal review of the literature was not undertaken. Further, details and designs of the primary studies were not reported. Uncertainty around the effectiveness estimates was not investigated in the sensitivity analysis.

Validity of estimate of measure of benefit
The summary benefit measure was calculated by combining data derived from official statistics, authors' assumptions, and some rates that were obtained from the literature. The benefit measure was specific to the intervention considered in the study. It would probably be difficult to compare it with the benefits of other health care interventions.

Validity of estimate of costs
The perspective adopted in the study was not explicitly stated and a breakdown of the cost items was not provided. Details of the unit costs and the quantities of resources used were not presented. The price year was not provided, which would make reflation exercises in other settings difficult. The sources of the cost and resource use data were reported. The costs were treated deterministically, but sensitivity analyses of the costs were carried out by varying some key variables.

Other issues
The authors made some comparisons of their findings with those from other studies that reported similar results. The issue of the generalisability of the study results to other settings was not addressed and only a few sensitivity analyses were conducted. The external validity of the analysis is, therefore, likely to be low. The study referred to pregnant women at risk for HIV infection and this was reflected in the conclusions of the study.

Implications of the study
The study results suggested that routine screening for HIV infection represents a cost-effectiveness strategy in a low-prevalence setting. However, caution is required when interpreting the results of the study due to the limitations of the analysis.

Source of funding
None stated.

Bibliographic details

PubMedID
9834719

Other publications of related interest

Indexing Status
Subject indexing assigned by NLM

MeSH
British Columbia /epidemiology; Canada; Cost-Benefit Analysis; Female; HIV Infections /diagnosis /epidemiology /ethnology /prevention & control /transmission; Humans; Infectious Disease Transmission, Vertical /prevention & control; Mass Screening /economics /statistics & numerical data; Pregnancy; Pregnancy Complications, Infectious /diagnosis /epidemiology /ethnology /virology; Prenatal Care /economics /statistics & numerical data; Prevalence; Retrospective Studies; Risk Factors

AccessionNumber
22000008089

Date bibliographic record published
30/09/2004

Date abstract record published
30/09/2004