Cost-effective use of nevirapine to prevent vertical HIV transmission in sub-Saharan Africa

Stringer J S, Rouse D J, Vermund S H, Goldenberg R L, Sinkala M, Stinnett A A

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 nevirapine to prevent vertical HIV transmission. The following strategies were considered: mass therapy (treating all pregnant women, without individual serodiagnosis); targeted therapy (serologic testing, followed by treatment of women who showed a positive test result); labour-and-delivery (LD) therapy (maternal infant NVP dosing on admission to LD unit); and infant only therapy (immediate postpartum NVP treatment for all infants).

Type of intervention
Primary prevention.

Economic study type
Cost-effectiveness analysis.

Study population
The study population was a hypothetical population of 10,000 pregnant women who initially did not know their HIV status.

Setting
Hospital. The economic study was carried out in Sub-Saharan Africa.

Dates to which data relate
Effectiveness and resource use data were collected from studies published between 1996 and 2000. Cost data were derived from a high prevalence site in Zambia and two studies published between 1999 and 2000. The price year was 1999.

Source of effectiveness data
Effectiveness data were derived from a literature review.

Modelling
A decision analytic model was used to determine the cost-effectiveness of alternative strategies of NVP administration.

Outcomes assessed in the review
The review assessed prevalence, consent to testing, test characteristics, adherence, prodromal labour, site of delivery, and transmission risk.

Study designs and other criteria for inclusion in the review
Results of the review
HIV prevalence was 15%. The probability of consenting to voluntary counselling and testing (VCT) with rapid testing was 82%. Rapid HIV testing had a sensitivity of 0.993 and specificity of 0.998. The probability that a woman would swallow the NVP pill provided was 89% among women who knew their serologic status. Adherence was 89% among women who knew their HIV status and 69% among those who did not, or 78% relative adherence for women receiving mass therapy compared with those receiving targeted therapy. 20% of women presented in prodromal labour and required a replacement NVP dose, but none required multiple replacement doses. All women issued a replacement dose actually swallowed the pill. 5.7% of women delivered either at home, on the way to hospital, or at another facility. The risk of perinatal transmission in the absence of NVP therapy was 25% and NVP therapy reduced this risk by 47%. NVP delivery to the infant only or to the mother only was half as effective as the HIVNET 012 regimen and LD therapy was 80% as effective as the HIVNET 012 regimen.

Measure of benefits used in the economic analysis
The number of cases of perinatal transmission averted was used as the measure of benefits. Benefits were discounted at an annual rate of 3%. A model was used to estimate benefits.

Direct costs
Direct costs were discounted at an annual rate of 3%. Quantities and costs were reported separately. Direct costs included the costs of counselling and testing, drug acquisition, and lifetime HIV-related health care costs for infants with HIV in Sub-Saharan Africa. The quantity/cost boundary adopted was that of the health service. The estimation of quantities and costs was based on actual data. Cost estimates were collected from a high prevalence site in Zambia and from two studies. The price year was 1999.

Indirect Costs
Not included.
Currency
US dollars ($).

Sensitivity analysis
One-way and two-way sensitivity analyses were conducted on model parameters.

Estimated benefits used in the economic analysis
The number of infections averted with prenatal intervention was 137 for targeted therapy and 160 for mass therapy. The number of infections averted with late intervention was 89 for infant only therapy and 142 with LD therapy. The total cost for the "do nothing" alternative was $105,797.

Cost results
Total costs with prenatal intervention were $116,925 for targeted therapy and $133,114 for mass therapy. Total costs with late intervention were $86,934 for infant only therapy and $118,417 for LD therapy.

Synthesis of costs and benefits
The incremental cost-effectiveness of prenatal intervention over "do nothing" was $81 per infection averted for targeted therapy and $691 per infection averted with mass therapy. The incremental cost-effectiveness of late intervention over "do nothing" was $593 per infection averted for LD therapy. If either infant only therapy or LD therapy were offered as second-line therapy, targeted therapy would be the economically preferred approach to early intervention. The optimal choice for early intervention was sensitive to prevalence, adherence to mass therapy, costs of NVP, VCT, and counselling without testing.

Authors' conclusions
NVP intervention offers a cost-effective route to prevent vertical HIV transmission in Sub-Saharan Africa. The optimal choice between mass therapy and targeted therapy cannot be confidently identified without information regarding adherence among women who do not know their serostatus. For women who do not receive NVP prenatally, treatment on presentation for delivery would be cost-effective even in the face of modest clinical efficacy.

CRD COMMENTARY - Selection of comparators
The reason for the choice of the comparator is clear, namely the "do nothing" alternative. You, as a user of the database, should decide if these health technologies are relevant to your own setting.

Validity of estimate of measure of benefit
The authors did not state that a systematic review of the literature had been undertaken. More details could have been provided about the methods of the review and in particular how the primary effectiveness estimates were determined. The estimation of benefits was obtained directly from the effectiveness analysis.

Validity of estimate of costs
All relevant cost categories were included. Quantities and costs were reported separately. Sensitivity analyses were conducted on costs and on quantities and the price year was reported. Cost might not be generalisable to other settings or countries.

Other issues
The incremental cost-effectiveness ratio calculated in the economic analyses compared each of the strategies with the
"do nothing" alternative. It would also have been helpful to compare the strategies with each other. The authors did make appropriate comparisons of their findings with those from other studies. The uncertainties of the data were accounted for in a set of sensitivity analyses. The authors did not present their results selectively. The study examined pregnant women who did not know their HIV status in Sub-Saharan Africa and this was reflected in the authors' conclusions. The authors did not consider downstream economic and health consequences of prenatal HIV counselling and testing in this analysis.

Implications of the study
Clinical assessment of adherence to therapy among women who do not know their status, and the field effectiveness of alternative approaches to NVP administration, is urgently needed to allow identification of optimal prevention strategies.

Source of funding
None stated.

Bibliographic details

PubMedID
11015154

Original Paper URL
Details of the tree structure used in the study can be found at: http://www.obgyn.uab.edu/stringer/nvpcea.html

Other publications of related interest

Indexing Status
Subject indexing assigned by NLM

MeSH
AIDS Serodiagnosis; Africa South of the Sahara; Anti-HIV Agents /administration & dosage /economics /therapeutic use; Cost-Benefit Analysis; Decision Support Techniques; Female; Gestational Age; HIV Infections /drug therapy /prevention & control /transmission; Humans; Infant, Newborn; Infectious Disease Transmission, Vertical /prevention & control; Nevirapine /administration & dosage /economics /therapeutic use; Pregnancy; Prenatal Care

AccessionNumber
2200001539

Date bibliographic record published
30/04/2001

Date abstract record published
30/04/2001