Cost-effectiveness of new WHO recommendations for prevention of mother-to-child transmission of HIV in a resource-limited setting

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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.

CRD summary
This study evaluated the cost-effectiveness of the revised World Health Organization (WHO) guidelines for the prevention of mother-to-child transmission of HIV, in HIV-infected pregnant women in Nigeria. The authors concluded that the WHO guidelines of long-course triple antiretroviral therapy (ART) for the mother plus infant ART were highly cost-effective, compared with the usual short-course ART. On the whole, this cost-effectiveness analysis was satisfactorily performed and the results were reported in detail. The authors’ conclusions appear to be appropriate.

Type of economic evaluation
Cost-effectiveness analysis, cost-utility analysis

Study objective
The objective was to evaluate the cost-effectiveness of the revised World Health Organization (WHO) guidelines, for the prevention of mother-to-child transmission of HIV, compared with a short-course of antiretroviral therapy (ART) for HIV-infected pregnant women.

Interventions
The WHO guidelines recommended a long course of triple ART for the mother, beginning at 14 weeks gestation and continuing until the end of breast feeding, plus ART for the infant, consisting of nevirapine daily for six weeks. This was compared with the minimum care in Nigeria, which was dual ART from 34 weeks gestation until one week post-partum, including one dose of nevirapine for the infant and one for the mother upon delivery. This was the usual practice of short-course ART.

Location/setting
Nigeria/secondary care.

Methods
Analytical approach:
A decision-tree model was developed to determine the cost-effectiveness of the prevention programmes, using published evidence. Three levels of coverage were modelled to provide estimates for: those receiving prevention at the time (10% of all pregnant HIV-infected women); those receiving antenatal care at the time (58% of pregnant infected women); and full coverage (100% of pregnant infected women). A lifetime horizon was adopted. The authors stated that the perspective was that of the health system.

Effectiveness data:
The effectiveness data were from published literature and included the antenatal care rates, postpartum care, breastfeeding rates, and infant and female life expectancies. The efficacy of each ART regimen was based on studies from Africa, which were assumed to be valid for Nigeria. The main clinical effectiveness estimates were the efficacy of each ART regimen, the number of paediatric HIV cases, and the coverage of treatment.

Monetary benefit and utility valuations:
Disability estimates were based on published literature, including the disability from infant HIV or AIDS and premature AIDS deaths. The AIDS disability weights for HIV-infected children were from a natural history study of HIV-infected children in their final nine months of life. The maternal health benefits of ART during pregnancy were not included.
Measure of benefit:
The measure of benefit was the number of disability-adjusted life-years (DALYs) averted and these were discounted at an annual rate of 3%. The number of HIV cases averted was calculated.

Cost data:
The cost categories included antenatal care, ART, HIV care, hospitalisation for labour and delivery, and voluntary counselling and testing. The cost data were from published literature and budget data from the President's Emergency Plan for AIDS Relief in Nigeria. The authors added 10% to the prevention programme cost to cover estimated capital costs. It was assumed that the costs for diagnostics and provider visits for infants were similar to those of adult out-patients and that HIV-infected infants, who were not on ART, required an average of seven days of hospitalisation per year due to immunosuppression. The costs were adjusted to 2010 US dollars ($) and an annual discount rate of 3% was applied.

Analysis of uncertainty:
One-way sensitivity analyses, and a two-way, a three-way, and a probabilistic sensitivity analysis were performed to assess the impact of uncertainty in the parameter estimates on the results. The results of these analyses were presented in a tornado diagram and a cost-effectiveness acceptability curve.

Results
At 10% coverage, the net total health system costs were estimated to be $98,400,000 with the intervention and $93,360,000 with standard care. At 58% coverage, the costs were $96,240,000 with the intervention and $70,320,000 with standard care. At 100% coverage, the costs were $94,320,000 with the intervention and $50,160,000 with standard care.

At 10% coverage, the intervention led to a total of 38,400 DALYs averted, compared with standard care. At 58% coverage, the intervention led to a total of 230,400 DALYs averted. At 100% coverage, the intervention led to 396,000 DALYs averted.

The incremental cost-effectiveness ratio of prevention based on WHO guidelines was $127 per DALY averted at 10% coverage, $113 per DALY averted at 58% coverage, and $111 per DALY averted at full coverage.

The one-way sensitivity analysis found that these ratios were most sensitive to changes in the lifetime health care costs for infants infected with HIV through mother-to-child transmission. The probabilistic sensitivity analysis found that, at a willingness-to-pay threshold of the gross domestic product per capita in Nigeria ($1,191), there was a 99.7% chance that the intervention would be cost-effective.

Authors' conclusions
The authors concluded that the WHO guidelines of long-course triple ART for the mother plus infant ART were highly cost-effective, compared with the usual short-course ART, for the prevention of mother-to-child HIV transmission in Nigeria.

CRD commentary
Interventions:
The interventions were well described and appear to have been appropriate comparators. The newly introduced WHO guidelines were intended to replace the standard care and were compared with this usual care. These strategies are likely to be relevant in other settings, with similar HIV burdens.

Effectiveness/benefits:
The selection of Nigerian and African published and administrative data for the clinical estimates was appropriate, given their relevance to the Nigerian health care system, but it was unclear if a systematic review was undertaken to ensure that all the best available data were analysed. DALYs appear to have been an appropriate measure of effectiveness, but little information on the source for the disability data was provided and the methods used to calculate the DALYs were unclear.
Costs:
The perspective of the study was clearly defined and it appears that all the relevant costs were considered. The cost estimates and their sources were provided clearly in a table, which should allow the possibility of replicating the cost analysis for other settings. The authors' assumptions were clearly presented and justified. Other details, such as the price year, currency, and use of discounting, were provided.

Analysis and results:
The analytic approach appears to have been appropriate and a diagram of the decision model was provided in an appendix. The incremental analysis was appropriate for determining the cost-effectiveness of the treatment strategies. The uncertainty in the parameter estimates was assessed in both univariate and probabilistic sensitivity analyses, and the results of both the base case and the sensitivity analyses were fully reported. The authors highlighted the strengths and limitations of their analysis.

Concluding remarks:
On the whole, this cost-effectiveness analysis was satisfactorily performed and the results were reported fully. The authors' conclusions appear to be appropriate.

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