A cost effectiveness and capacity analysis for the introduction of universal rotavirus vaccination in Kenya: comparison between Rotarix and RotaTeq vaccines
van Hoek AJ, Ngama M, Ismail A, Chuma J, Cheburet S, Mutonga D, Kamau T, Nokes DJ

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
The objective was to assess the cost-effectiveness of the introduction of universal rotavirus vaccination in Kenya. The authors concluded that vaccination was cost-effective, with either vaccine. The methods were adequate, but details of the model should have been reported. Given the scope of the analysis, the authors’ conclusions appear to be valid.

Type of economic evaluation
Cost-utility analysis

Study objective
The objective was to assess the cost-effectiveness of the introduction of universal rotavirus vaccination in Kenya.

Interventions
Universal rotavirus vaccination, for new born children in Kenya, was compared with no vaccination. Two vaccines were assessed: a monovalent human rotavirus vaccine of genotype G1P(8), delivered in two doses, at weeks six and 10, under the trade name Rotarix; and a bovine backbone vaccine of genotypes G1, G2, G3, G4 and P1A(8), delivered in three doses at weeks six, 10 and 14, under the trade name RotaTeq.

Location/setting
Kenya/Primary care.

Methods
Analytical approach:
A model was used to assess the costs and outcomes of vaccination. The time horizon was five years. The authors stated that the health care system and societal perspectives were adopted.

Effectiveness data:
The clinical and effectiveness data were from published studies, World Health Organization (WHO) reports and data, and other reports. The main measure of effectiveness was the efficacy of the two vaccines in preventing diarrhoeal disease, due to rotavirus. Based on published studies, the two vaccines were assumed to be equally effective. Estimates of vaccination coverage were based on published data from the Kenyan National Bureau of Statistics.

Monetary benefit and utility valuations:
Disability weights were from a published study.

Measure of benefit:
The measure of benefit was disability-adjusted life-years (DALYs) averted. Future benefits were discounted at an annual rate of 3%.

Cost data:
The direct costs included those of medication, supplies, staff, running of facilities, out-patient visits, and hospital admissions. Direct and indirect medical costs were from a published study. All costs were updated to 2011, using the Consumer Price Index for Kenya. Future costs were discounted at an annual rate of 3%. All costs were reported in US$.
Analysis of uncertainty:

Scenario analyses were performed by varying the key assumptions, including: mortality, costs, vaccine efficacy, waning of vaccine efficacy, and incidence of out-patient disease. A probabilistic sensitivity analysis was performed, using distributions for each model parameter, with 1,000 samples drawn from each distribution. The results of the probabilistic sensitivity analysis were presented in cost-effectiveness acceptability curves.

Results

Compared with no vaccination, from a health care system perspective, the incremental cost-utility ratio for Rotarix vaccination was $147 per DALY averted, and that for RotaTeq was $293 per DALY averted. From a societal perspective, the ratio for Rotarix was $142 per DALY averted, and that for RotaTeq was $288 per DALY averted.

The probabilistic sensitivity analysis showed that at a cost-effectiveness threshold of around $350 per DALY averted, both vaccination interventions were cost-effective in 100% of simulations, compared with no vaccination.

Authors’ conclusions

The authors concluded that vaccination against rotavirus was cost-effective in Kenya, with either vaccine.

CRD commentary

Interventions:
The interventions were described in full. The rationale for the selection of the comparators was clear as vaccination with each vaccine, was compared with no immunisation, which was the usual care in Kenya.

Effectiveness/benefits:
The clinical and effectiveness data were from published studies and reports. The sources included Kenyan surveys, WHO databases and reports, and clinical trials that were relevant to Kenya. The authors did not report a systematic review to identify these sources, making it unclear if all the relevant evidence was included. The disability weights were from published studies, but the approach used to derive them was not described.

Costs:
The authors explicitly reported that the perspectives were those of the health care system and society. From a health care system perspective, all the relevant major cost categories and costs appear to have been included. For the societal perspective, there were few details of the indirect costs, making it unclear if all the relevant major costs were included. The sources for the costs were reported. The price year, time horizon, discount rate, and currency were all stated.

Analysis and results:
The authors did not describe the model used to synthesise the cost and outcome information, and no diagram was provided. The results were clearly presented. Incremental cost-utility ratios were appropriately calculated to synthesise the costs and benefits of vaccination. Uncertainty in the results was tested in scenario analyses and probabilistic sensitivity analyses. As the main limitation to their study, the authors reported that vaccine efficacy was uncertain, because oral vaccines were found to be less efficacious in developing countries for unknown reasons. The findings were specific to Kenya, but might be transferable to countries with similar epidemiological estimates, vaccine costs, and gross domestic product.

Concluding remarks:
The methods were adequate, but details of the model should have been reported. Given the scope of the analysis, the authors' conclusions appear to be valid.

Funding

Support received from the Wellcome Trust.

Bibliographic details

van Hoek AJ, Ngama M, Ismail A, Chuma J, Cheburet S, Mutonga D, Kamau T, Nokes DJ. A cost effectiveness and capacity analysis for the introduction of universal rotavirus vaccination in Kenya: comparison between Rotarix and
RotaTeq vaccines. PLOS ONE 2012; 7(10): e47511

PubMedID
23115650

DOI
10.1371/journal.pone.0047511

Original Paper URL
http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0047511

Indexing Status
Subject indexing assigned by NLM

MeSH
Child, Preschool; Cost of Illness; Cost-Benefit Analysis; Humans; Kenya /epidemiology; Rotavirus /immunology; Rotavirus Infections /epidemiology /prevention & control; Viral Vaccines /administration & dosage

AccessionNumber
22012041657

Date bibliographic record published
08/01/2013

Date abstract record published
18/04/2013