Cost-effectiveness of infant vaccination with RIX4414 (Rotarix(TM)) in the UK

Martin A, Batty A, Roberts JA, Standaert B

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 determined the cost-effectiveness of rotavirus vaccination using Rotarix™ for infants in the UK. The authors concluded that it was cost-effective, according to the National Institute for Health and Clinical Excellence threshold, when added to the paediatric vaccination schedule. Overall, the methodology was satisfactory and the results and methods were well reported. The authors’ conclusions appear to be appropriate.

Type of economic evaluation
Cost-utility analysis

Study objective
The objective was to determine the cost-effectiveness of including rotavirus vaccination using Rotarix™ in the UK paediatric vaccination schedule.

Interventions
A strategy of no rotavirus vaccination was compared with universal rotavirus vaccination. The vaccination comprised a two-dose oral human vaccination administered at two and four months of age.

Location/setting
UK/primary care.

Methods
Analytical approach:
A Markov model with a cycle length of one month was constructed based on a published model (Melliez, et al. 2005, see ‘Other Publications of Related Interest’ below for bibliographic details). The time horizon was lifetime and the authors stated that the perspectives were those of the UK National Health Service (NHS) and society.

Effectiveness data:
The authors used their judgement to select the most appropriate estimates and incidence rates from the available evidence found in the published literature. They multiplied these incidence rates by the UK child population under five years old to generate the number of cases. This was used, with the distribution patterns of rotavirus infection, to estimate the transition probabilities. Vaccine efficacy rates were taken from a phase IIIb European clinical trial (Vesikari, et al. 2007, see ‘Other Publications of Related Interest’ below for bibliographic details) for the first and second year, and decreased by 10% in each subsequent year. The main clinical parameters were the vaccine efficacy and the incidence rates.

Monetary benefit and utility valuations:
The utility estimates were obtained from a UK study, which used the European Quality of life (EQ-5D) questionnaire to derive the utility for various severities of rotavirus gastroenteritis. These quality of life ratings were obtained from general practitioners (GPs) and paediatricians (Martin, et al. 2008, see ‘Other Publications of Related Interest’ below for bibliographic details).

Measure of benefit:
The benefit measure was the number of quality-adjusted life-years (QALYs).

Cost data:
The cost categories included the costs of vaccine, hospitalisation, accident and emergency treatment, GP treatment, direct NHS treatment, prescription, and carers. The unit cost data were obtained from published literature. The price year was 2006 and costs were inflated using the Hospital and Community Health Services indices for health care costs and the Consumer Price Index for other costs. An annual discount rate of 3.5% was applied.

Analysis of uncertainty:
One-way sensitivity analysis was performed by varying the model inputs within their 95% confidence intervals. The results were discussed and presented in a diagram. Probabilistic sensitivity analysis was performed with 5,000 repetitions of Monte Carlo simulation. The results were presented using cost-effectiveness acceptability curves.

Results
The total costs per child for vaccination compared with no vaccination were £47.40 from the NHS perspective, and £23.31 from the societal perspective. The total QALYs per child were 25.981 with vaccination and 25.979 without vaccination. The incremental QALYs per child for vaccination compared with no vaccination were 0.002.

The incremental cost-effectiveness ratio (ICER) of vaccination compared with no vaccination was £23,298 per QALY gained from the NHS perspective, and £11,459 per QALY gained from the societal perspective.

The results of the sensitivity analysis showed that the cost of hospitalisation and the number of GP visits were the most influential variables. Vaccination, compared with no vaccination, had over 90% probability of an ICER below £30,000 per QALY.

Authors' conclusions
The authors concluded that infant rotavirus vaccination in the UK was cost-effective according to the National Institute for Health and Clinical Excellence threshold, when added to the current paediatric vaccination schedule.

CRD commentary
Interventions:
The vaccination strategy was well described, and was appropriately compared with the current infant vaccination schedule without rotavirus. This vaccination is likely to be relevant in other settings.

Effectiveness/benefits:
The effectiveness data were based on various sources, ranging from a large randomised controlled trial to relevant literature selected by experts. No systematic review of the literature was reported, so it is not possible to ascertain if the best available clinical evidence was used. The sources of data were all selected based on their relevance to the study setting and were generally well reported. The sources for the utility estimates, the instruments used to derive them, and who they were derived from, were all clearly stated, which makes the utility valuation transparent.

Costs:
The perspectives were stated and it would appear that all the relevant costs for them were considered. The cost analysis was thorough. For example, the valuation of productivity costs was reported in detail and justified. The sources of the cost data were referenced and details such as the price year and the use of discounting were reported.

Analysis and results:
The use of an incremental analysis was appropriate for determining the cost-effectiveness of the inclusion of Rotarix™ in the infant vaccination schedule. The issue of uncertainty was appropriately addressed with both one-way and probabilistic sensitivity analyses. The results of both the base case and the sensitivity analyses were clearly presented. The authors highlighted the limitations of their model. They also highlighted the differences between their study and another study in the UK and compared these with studies in other countries.

Concluding remarks:
Overall, the methodology was satisfactory, and the results and methods were well reported. The authors' conclusions appear to be appropriate.
Funding
Funded by GlaxoSmithKline Ltd, Middlesex, UK.

Bibliographic details
Martin A, Batty A, Roberts JA, Standaert B. Cost-effectiveness of infant vaccination with RIX4414 (Rotarix(TM)) in the UK. Vaccine 2009; 27(33): 4520-4528

PubMedID
19446594

DOI
10.1016/j.vaccine.2009.05.006

Original Paper URL
http://dx.doi.org/10.1016/j.vaccine.2009.05.006

Other publications of related interest


Indexing Status
Subject indexing assigned by NLM

MeSH
Cost-Benefit Analysis; England /epidemiology; Great Britain; Humans; Infant; Markov Chains; Models, Economic; Quality-Adjusted Life Years; Rotavirus Infections /economics /epidemiology /prevention & control; Rotavirus Vaccines /economics; Vaccination /economics; Vaccines, Attenuated /economics

AccessionNumber
22009102559

Date bibliographic record published
23/09/2009

Date abstract record published
25/11/2009