Exploring the cost effectiveness of an immunization programme for rotavirus gastroenteritis in the United Kingdom
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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 compared the costs and effects of adding a new generation rotavirus vaccine to the current immunisation programme in the UK. The authors concluded that rotavirus vaccination is only cost-effective from a societal viewpoint, although lower incidence rates, a less effective vaccine, and parents not taking time off work all have the potential to negate these cost savings. The methods were appropriate and were mostly well-reported. Despite some limitations, overall, the authors’ conclusions appear to be reasonable.

Type of economic evaluation
Cost-effectiveness analysis

Study objective
The purpose was to assess the potential cost-effectiveness of adding rotavirus vaccine to the current UK National Immunisation Programme (NIP) to prevent rotavirus gastroenteritis in children.

Interventions
The costs and effects of a new generation of rotavirus vaccine, administered orally in three separate doses to children from age 2 years and aligned with the current UK NIP were compared with the UK NIP on its own. The current immunisation programme includes vaccines for diphtheria, tetanus, polio, pertussis, Haemophilus influenzae type b, meningitis C, measles, mumps and rubella.

Location/setting
UK/primary prevention.

Methods
Analytical approach:
A decision analytic model was used to synthesise published and national data estimates. The costs and effects were analysed for a single cohort of infants over five years. Previous models from published reports were used to structure the model (Smith et al. 1995, Tucker et al. 1998, and Carlin et al. 1999, see ‘Other Publications of Related Interest’ below for bibliographic details). The authors stated that the two study perspectives were those of the National Health Service (NHS) and a wider societal view.

Effectiveness data:
The effectiveness data were derived from a combination of published literature and national reports. Several endpoints were used including avoided episodes of rotavirus gastroenteritis, general practitioner (GP) visits, and hospitalisations. Some assumptions were made for the model parameters.

Monetary benefit and utility valuations:
None.

Measure of benefit:
The measures of benefit were cases of gastroenteritis prevented, GP visits avoided, hospitalisations avoided, and life-years gained. These were discounted at a rate of 3.5%.
Cost data:
The types of direct medical resources included the costs of NHS telephone advice, GP visits, emergency department attendances, paediatric hospitalisations, and medicines. The additional costs to society were parental productivity losses, and over-the-counter medicines. The prices were sourced from national reports and the costs were discounted at 3.5%. The Hospital and Community Services pay and prices and retail price indices were used to inflate costs to 2005 to 2006 UK pounds sterling (£). The human capital approach was used to estimate lost production costs arising from parental absence from work to care for a sick child and median weekly wages were used.

Analysis of uncertainty:
One-way sensitivity analyses were performed to examine the effects of changes in all variables on the base results. A threshold analysis was also undertaken to determine the break-even price of the vaccine. The net costs per eligible child were presented to show the results of the sensitivity analyses, and the threshold analysis was presented graphically.

Results
From a societal perspective, the total cost per child to include a rotavirus vaccine in the UK NIP was £79.19 compared with £86.33 for the UK NIP alone. From a NHS perspective, the net cost per child to include a rotavirus vaccine in the UK NIP was £42.49.

From a societal perspective, a birth cohort of 632,000 children would produce net savings of £4.5 million, while, from a NHS perspective, costs of £26.7 million would be incurred over five years.

From a health service perspective, the rotavirus vaccine programme was predicted to yield an incremental cost-effectiveness of £60.41 per episode avoided, £526.16 per GP visit avoided, £2,526.54 per hospitalisation avoided and £177,212 per life-year saved. The results were sensitive to days off work, foregone earnings, vaccine efficacy, incidence of rotavirus, and the discount rate.

From a societal perspective, savings were negated if parents did not take time off work or did not lose income by caring for a sick child.

The results from the threshold analysis indicated that a vaccine price to the NHS of less than £13.53 for a course of 3 doses would be required if savings were to be produced, whereas the actual price for 3 doses was estimated at £60.

The results were fairly robust when best and worst case scenarios were evaluated.

Authors' conclusions
The authors concluded that rotavirus vaccination is only cost-effective from a societal viewpoint, although lower incidence rates, a less effective vaccine, and no time off work for parents, all have the potential to negate the cost savings.

CRD commentary
Interventions:
The two immunisation options were clearly described. The profile of the intended patient population, the natural history of the disease, and the scheduling of vaccines were also reported clearly.

Effectiveness/benefits:
The effectiveness data were derived from various published studies and, as the methods used to select these studies were not reported, it is not possible to ascertain whether these were the best available evidence.

Costs:
The costs included in the analysis appear to be relevant to the two perspectives (NHS and societal). The costing methods, assumptions, their sources, and the unit costs were all well reported and transparent. The price year and discount rate were presented and the costs were adjusted for inflation.

Analysis and results:
A clear illustration of the decision tree model structure was presented and a thorough description of the tree pathways was given. The health outcomes and net costs were synthesised into incremental cost-effectiveness ratios. However, the health outcomes were not reported separately from these ratios. The one-way sensitivity analyses were comprehensive and tested all the parameters over sufficiently large variations. Whilst this method is acceptable, a probabilistic sensitivity analysis would have been useful to indicate the range of possible results when parameters are changed simultaneously. The authors identified and justified a number of limitations to their study, including the lack of accurate rotavirus incidence data, the lack of utility data from which to derive quality-adjusted life-years, assumptions on vaccine price, and the ease of assimilating a new vaccine into the UK NIP. The authors discussed their results in comparison with one other economic study evaluating the new generation of rotavirus vaccines and they accounted for the differences in their findings.

Concluding remarks:
Overall, the study methods were appropriate and explicitly reported, with the major limitations highlighted by the authors. Their conclusions appear to be a good assessment of the analysis completed.

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Other publications of related interest


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