Cost-effectiveness analysis of palivizumab as respiratory syncytial virus prophylaxis in preterm infants in Sweden

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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
The objective was to assess the cost-effectiveness of palivizumab prophylaxis for respiratory syncytial virus (RSV) infection in pre-term infants. The authors concluded that palivizumab was cost-effective if a severe RSV infection increased the asthma risk and mortality. The methods were good, but those used to identify the published studies were not reported. The results were given in full. Given the uncertainty around some of the evidence, the qualified conclusions appear to be appropriate.

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

Study objective
The objective was to assess the cost-effectiveness of palivizumab prophylaxis, compared with no prophylaxis, for respiratory syncytial virus (RSV) infection in pre-term infants.

Interventions
Prophylaxis using five injections of palivizumab 15mg per kg was compared with no prophylaxis for RSV infection in infants born at less than 29 weeks of gestation.

Location/setting
Sweden/secondary care.

Methods
Analytical approach:
A decision-analytic Markov model was used to estimate the costs and outcomes for the two options. The time horizon was the lifetime of the patient. The authors reported that a societal perspective was adopted.

Effectiveness data:
The clinical and effectiveness data were from published studies and national linked registers that included 3,801 infants born before 29 weeks gestation, between 1990 and 2005; 397 infants died during their first year of life. The median follow-up was 10.2 years. The main effectiveness parameters were the effect of RSV prophylaxis on RSV hospitalisation risk, asthma risk, and death risk. These estimates were from published studies, including the IMpact-RSV trial which supplied the risk reduction for RSV hospitalisation with palivizumab. Swedish studies supplied the risk of asthma in infants with a history of RSV hospitalisation.

Monetary benefit and utility valuations:
The utility estimates were from a study of RSV-hospitalised and non-hospitalised UK pre-term infants that used the Health Utilities Index (HUI-2). These estimates were supplemented by the authors’ assumptions and data from other published studies.

Measure of benefit:
Quality-adjusted life-years (QALYs) and life-years were the benefit measures. Future outcomes were discounted at an annual rate of 3%.
Cost data:
The direct costs included those for RSV hospitalisation on a general ward, including length of stay and hotel costs for the accompanying parent; intensive care unit admission; asthma, including health care resources and medication; and prophylaxis, including the drug and its administration. The resource use and costs were from Swedish statistics, national registers, and published studies. The indirect costs included those of parents who took time off work for the five prophylaxis injections, hospitalisation, and when the child was unable to go to school due to asthma. The days off work were based on published studies and average Swedish wages were used. All costs were reported in Swedish kronor (SEK) and the price year was 2009. Future costs were discounted at an annual rate of 3%.

Analysis of uncertainty:
One- and two-way sensitivity analyses were undertaken. A probabilistic sensitivity analysis was performed by fitting probability distributions to all the model parameters. The results were presented in cost-effectiveness acceptability curves.

Results
The average cost per patient was SEK 60,684 with prophylaxis and SEK 40,663 without prophylaxis; a difference of SEK 20,020. The average QALYs per patient were 27.069 with prophylaxis and 26.967 without; a gain of 0.102 QALYs. The average life-years per patient were 30.584 with prophylaxis and 30.511 without; a gain of 0.073 life-years.

Compared with no prophylaxis, the incremental cost-effectiveness of prophylaxis was SEK 275,907 per life-year gained, and its incremental cost-utility was SEK 195,420 per QALY gained.

The probabilistic sensitivity analysis showed that at cost-effectiveness threshold of SEK 100,000 per QALY gained, prophylaxis was cost-effective in 14% of simulations. At a threshold of SEK 500,000 per QALY gained it was cost-effective in 99% of simulations.

The other sensitivity analyses showed that if RSV prophylaxis had no impact on mortality and asthma, the incremental cost-utility of prophylaxis was SEK 8,856,829 per QALY gained.

Authors’ conclusions
The authors concluded that palivizumab was cost-effective for pre-term infants, if a severe RSV infection increased the asthma risk and mortality.

CRD commentary
Interventions:
The interventions were described, including the dosage. The rationale for their selection was clear and they appear to have been appropriate.

Effectiveness/benefits:
The clinical and effectiveness data were from national linked registers and published studies. All sources were reported, but the methods used to identify and select them were not. This makes it difficult to determine if the best available evidence was used. The estimation of the effect of prophylaxis on asthma was reported in an online appendix, which should be consulted to judge the quality of the clinical evidence. The two benefit measures QALYs and life-years were appropriate as they captured the impact of the disease and intervention on survival and quality of life. The derivation of the utility values was clearly described and appears to have been appropriate.

Costs:
The authors reported that a societal perspective was adopted and the major cost categories and costs relevant to this perspective appear to have been analysed. The authors reported the sources for the unit costs and resource use. A breakdown of individual costs items was provided and resource use quantities were presented separately from costs. This will help when replicating the analysis for other settings. The price year, time horizon, discount rate, and currency were all reported, which will assist in reflation exercises for other time periods.

Analysis and results:
The costs and outcomes were synthesised in a decision-analytic Markov model. The model structure was reported, with
a diagram, and further information was given in the appendix. An appropriate incremental analysis was undertaken and the results were fully and clearly presented. The impact of uncertainty on the results was assessed in one- and two-way, as well as probabilistic sensitivity analyses, enhancing the generalisability of the findings. The authors reported that the main limitation of their study was the uncertainty around the impact of RSV prophylaxis on mortality and asthma.

Concluding remarks:
The methods were good, but those used to identify the published studies were not reported. The results were given in full. Given the uncertainty around some of the evidence, the qualified conclusions appear to be appropriate.

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