Oral ondansetron administration in emergency departments to children with gastroenteritis: an economic analysis

Freedman SB, Steiner MJ, Chan KJ

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 oral ondansetron for children with vomiting, secondary to gastroenteritis, in the emergency department. The authors concluded that ondansetron plus oral rehydration therapy was dominant, as it was less costly and more beneficial than oral rehydration alone. Small differences between the interventions in quality of life and Canadian costs, as well as poor methods and insufficient analysis of uncertainty, make the cost-effectiveness of ondansetron uncertain.

Type of economic evaluation
Cost-utility analysis

Study objective
This study evaluated the cost-effectiveness of oral ondansetron for children with vomiting, secondary to gastroenteritis, in the emergency department.

Interventions
Routine oral rehydration therapy alone was compared with oral rehydration plus the antiemetic ondansetron for children with moderate-to-severe gastroenteritis.

Location/setting
USA, Canada/emergency care.

Methods
Analytical approach:
The economic evaluation used a decision tree with a one-year time horizon. The model incorporated the likelihood of vomiting, the receipt of intravenous rehydration, admittance to hospital, an emergency department revisit, and further intravenous rehydration and hospital admittance. The authors reported a health care perspective and a societal perspective.

Effectiveness data:
The key effectiveness outcome was the likelihood of vomiting with treatment. This was from a meta-analysis. Other clinical data, such as the probabilities of intravenous rehydration, if vomiting or not, in an emergency department, and admission to hospital, were from individual randomised controlled trials or from raw data requested from the authors.

Monetary benefit and utility valuations:
The utility estimates for the children in the model were from a published study of 450 parents who gave utility values for their children in the USA. Values were assigned for moderate and severe gastroenteritis health states. Moderate gastroenteritis was assumed for patients who were discharged home, without intravenous rehydration; and those who received intravenous rehydration and were discharged home. Severe gastroenteritis was assumed for patients who were given intravenous rehydration and admitted to hospital.

Measure of benefit:
Quality-adjusted life-years (QALYs) were the primary measure of benefit.
Cost data:
Separate cost analyses were conducted for the USA and Canada. Medical and non-medical costs were included. Medical costs covered hospitalisation, emergency department visits, physician, intravenous insertion, and ondansetron. Non-medical costs were foregone parental earnings, special food and oral rehydration, extra nappies, and travel. Drug costs were from average wholesale prices in the USA. These costs were expected to be higher than public and private payers would pay. Drug costs in Canada were from provincial drug prices. Other medical costs were from databases for the respective countries. In the USA, hospital charges were converted to costs using a ratio from the Centers for Medicare and Medicaid Services. Costs were reported in 2006 Canadian dollars (CAD) and US $; CAD were valued at $0.88. Where necessary, the costs were inflated using medical or health indices.

Analysis of uncertainty:
One-way and probabilistic sensitivity analyses were conducted. The one-way results were reported in a table and as tornado diagrams. The exchange rate was varied from $0.80 to $1.00. The probabilistic analyses used normal and gamma distributions. The authors estimated the number of children who were eligible for ondansetron in the USA (172,549) and in Canada (23,981); these estimates were used to determine the number of probabilistic simulations.

Results
In the deterministic analysis, for the USA, per patient health care costs were $353 less for ondansetron and societal costs were $379 less for ondansetron. The savings in Canada were much smaller; CAD 49 for the health care perspective, and CAD 72 for the societal perspective. The estimated QALY gains per patient with ondansetron were 0.0015.

Ondansetron was less costly and more effective.

One-way sensitivity analyses did not change these results. The probabilistic cost results were almost identical.

Authors' conclusions
The authors concluded that ondansetron was dominant, as it was less costly and more beneficial.

CRD commentary
Interventions:
The two interventions were sufficiently described. Oral rehydration was described as routine care, which was an appropriate comparator for oral rehydration plus ondansetron.

Effectiveness/benefits:
The clinical effectiveness data were from a meta-analysis, with further data from trials and the authors of these. The authors of this study did not report how the meta-analysis was conducted, and as most of the probabilities in the model were from the additional information, it was not clear if they were based on robust data. The primary measure of benefit was from a large study of caregivers who provided values for their children. The authors did not report how these values were derived, which makes it difficult to assess the generalisability of the data. Given that gastroenteritis is a short-term condition, the time for which the utility scores were applied, might change the results. The model assumed a one-year time horizon, which could significantly overestimate the benefit of treatment.

Costs:
The costs appear to have been from appropriate sources, for both countries, with appropriate reporting on the price year, and necessary currency conversions and inflation.

Analysis and results:
The data sources appear to have been good, and the authors' conclusion was supported by other work. There was some discussion of the limitations of this study. The differences in benefits were very small, and the difference per patient in costs was small for Canada. It would have been appropriate to include these parameters in the probabilistic sensitivity analysis; there was no indication that this happened. The only model parameters that were reported for the probabilistic sensitivity analysis were the transition probabilities. The authors used normal, and gamma distributions for the probabilities, which were inappropriate as they could extend beyond the probability limits. The probability distributions may have been truncated, but this was not mentioned. It is unclear what effect this could have on the probabilistic
analysis. The uncertainty around the cost-effectiveness results was not reported.

Concluding remarks:
Small differences between the interventions in quality of life and Canadian costs, as well as poor methods and insufficient analysis of uncertainty, make the cost-effectiveness of ondansetron uncertain.

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