Cost-effectiveness of early intervention with once-daily budesonide in children with mild persistent asthma: results from the START study


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.

Health technology
The use of inhaled budesonide, 200 microg once daily via Turbuhaler, in children with asthma.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised children aged 5 to 10 years with mild persistent asthma.

Setting
The setting was secondary care. The economic study was carried out in the USA.

Dates to which data relate
The effectiveness and resource use data were derived from a study published in 2003. The price year was 1999.

Source of effectiveness data
The effectiveness data were derived from a single study.

Link between effectiveness and cost data
The costing was carried out prospectively on the sample of children included in the effectiveness study.

Study sample
Power calculations were not reported. Overall, 1,974 children from the START trial were included in the current study. There were 1,000 children (60.6% boys) in the budesonide group and 974 children (59.3% boys) in the control group (which received placebo via Turbuhaler). The mean age was 8.3 (+/- 1.5) years in the budesonide group and 8.4 (+/- 1.4) years in the control group.

Study design
This was a prospective, randomised, double-blinded clinical trial that was carried out in 32 countries. The length of follow-up was 3 years. Few details of the loss to follow-up and of the assessment methods were reported.
Analysis of effectiveness
The primary outcome measure used in the current analysis was the number of symptom-free days (SFDs). This was assessed by 2-week recall at each clinic visit. The number of SFDs was discounted at an annual rate of 3%. The study groups appear to have been comparable at baseline.

Effectiveness results
Children in the budesonide group gained a mean (undiscounted) of 5.6 SFDs per year in comparison with children in the control group.

Overall, the mean 3-year SFDs were 964 (+/- 3.2) in the budesonide group and 948 (+/- 3.4) in the control group.

Clinical conclusions
The effectiveness analysis showed that budesonide added to usual care improved symptoms in children with asthma.

Measure of benefits used in the economic analysis
The summary benefit measure used was the number of SFDs. This was derived directly from the effectiveness analysis.

Direct costs
The analysis of the direct costs was carried out from the perspective of the health care system. The categories of costs included were days spent in hospital, number of emergency room visits, physician or nurse contacts, telephone contacts, and use of drugs to treat asthma (including study medication). The unit costs and the quantities of resources used were presented separately. Resource use was collected prospectively alongside the clinical trial. The drug costs came from average wholesale prices, reduced by 15% to take account of discounting. The sources of the other costs were unclear. Discounting was relevant, as the costs were incurred over a 3-year timeframe, and an annual rate of 3% was applied. The price year was 1999.

Statistical analysis of costs
The cost data were logarithmically transformed because of their skewed nature.

Indirect Costs
The indirect costs (i.e. the numbers of days on which school was missed, or on which a caregiver had to take time off to look after their sick child because of asthma) were included as a societal perspective was also adopted. These costs were recorded at the follow-up visits. Costs were estimated using mean daily wages. The unit costs and the quantities of resources used were presented separately. As in the analysis of the direct costs, an annual discount rate of 3% was applied and the price year was 1999.

Currency
US dollars ($).

Sensitivity analysis
Univariate sensitivity analyses were carried out to assess the robustness of cost-effectiveness ratios to variations in the discount rates and unit costs. Moreover, estimates of cost and SFDs were adjusted for the overall mean gross national product per capita and for pre-specified baseline socioeconomic and clinical variables by using a regression analysis. The authors appear to have set the alternative ranges of values used.

Estimated benefits used in the economic analysis
See the 'Effectiveness Results' section.

**Cost results**
From the perspective of the health care system, the total costs per patient were $1,347 (+/- 60) with usual care and $1,516 (+/- 45) with budesonide.

From the perspective of society, the total costs per patient were $2,581 (+/- 149) with usual care and $2,389 (+/- 108) with budesonide.

**Synthesis of costs and benefits**
Incremental cost-effectiveness ratios were calculated to combine the costs and benefits of the treatments examined in the study.

From the perspective of the health care system, the incremental cost per additional SFD with budesonide in comparison with usual care was $10.50 (95% confidence interval: 1.2 - 33.3). When the societal perspective was used, budesonide dominated usual care, which was both less effective and more expensive.

The sensitivity analysis showed that changes in discount rates and cost estimates did not alter the base-case conclusions of the analysis. The regression analysis of SFDs and costs showed statistically significant dependence on per capita gross national product and percentage SFD at baseline.

**Authors' conclusions**
Once-daily budesonide added to usual asthma care in children with mild persistent asthma was cost-saving from a societal perspective and was acceptably cost-effective from a health care payer perspective.

**CRD COMMENTARY - Selection of comparators**
The rationale for the choice of the comparators was clear since the new intervention was compared with usual care. You should decide whether they are valid comparators in your own setting.

**Validity of estimate of measure of effectiveness**
The effectiveness evidence was obtained from a clinical trial, which was appropriate for the study question. The randomised, masked and multi-centred design enhances the internal validity of the study. Further, a large sample of patients was enrolled and the length of follow-up appears to have been appropriate. However, limited information on patient selection and the design of the study was provided, as the main clinical trial had been published elsewhere. The authors stated that the "real-world" setting of the clinical trial represents a strength of the analysis.

**Validity of estimate of measure of benefit**
The benefit measure was specific to the disease considered in the study. It will not be comparable with the benefits of other health care interventions. The impact of the treatment on quality of life was not assessed. However, SFDs are commonly used to assess the effect of treatments for asthma.

**Validity of estimate of costs**
The analysis of the costs was conducted from two different perspectives, both of which were appropriate. The authors reported extensive details of the cost analysis, which was the main objective of the study. In particular, a detailed breakdown of the cost categories was provided, and the unit costs, quantities of resources used and price year were reported. This enhances the possibility of replicating the analysis in other settings and in other time periods. A potential limitation of the analysis was the lack of clear information on the sources of some costs. Appropriate statistical tests were carried out to deal with the non-normal distribution of the costs. Finally, the use of alternative cost estimates was
investigated in the sensitivity analysis.

**Other issues**
The authors stated that their findings were similar to those from other studies. The issue of the generalisability of study results to other settings was not explicitly addressed, but several sensitivity analyses were carried out. The authors noted that the cost results may vary slightly when using cost estimates from other countries. The analysis referred to children with mild persistent asthma and this was reflected in the authors' conclusions.

**Implications of the study**
The study results appear to support the use of once-daily budesonide added to usual asthma care in children. The authors stated that future studies should be carried out in larger numbers of patients in a dedicated trial in young children with early disease.

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None stated.

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**Other publications of related interest**


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