**Cost-effectiveness analysis of corticosteroid inhaler devices in primary care asthma management: a real world observational study**


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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 aim was to evaluate the cost-effectiveness of three inhaled corticosteroid devices using observational data. The authors concluded that the real cost-effectiveness of inhaled corticosteroid inhalers might vary and the cost of the device as well as the potential health care resource use savings should be considered. There were limitations to this study, but the methods and reporting were satisfactory. The results appear to be reliable.

**Type of economic evaluation**
Cost-effectiveness analysis

**Study objective**
The objective was to evaluate the cost-effectiveness of three inhaled corticosteroid devices in asthma patients.

**Interventions**
Three inhaled corticosteroid devices were compared: pressurised metered dose inhalers (MDIs), breath-actuated MDIs (BAIs) and dry powder inhalers (DPIs). MDIs were the usual care.

**Location/setting**
UK/primary care.

**Methods**

**Analytical approach:**
The study was based on data collected from a single dataset of UK primary care practice records (General Practice Research Database). The analysis was conducted for two different patient populations: one that initiated inhaled corticosteroid therapy and one that was prescribed an increased dose of inhaled corticosteroids. Included patients needed to have been registered at the same practice and had up-to-standard follow-up data for at least 12 months before and 12 months after the index prescription date of the initiation of inhaled corticosteroid therapy or first increase in inhaled corticosteroid dose. The study used 10 years of data and considered outcomes over one year. The authors stated that the perspective was that of the UK NHS.

**Effectiveness data:**
The effectiveness data came from a single observational study (General Practice Research Database). The analysis was based on an observational database study that identified patients who started or increased inhaled corticosteroid therapy and continued for one year. Potential confounders, which included age, sex, socioeconomic status, comorbid conditions and other treatments, were adjusted for in regression analysis. The sample size was 56,347. The main measure of effectiveness was achievement of control during the outcome year, defined as a composite of no hospital attendance for asthma, no prescription for oral corticosteroids and no lower respiratory tract infection that required antibiotics. An additional measure of control added an additional parameter of daily doses of 200 micrograms (μg) or less of salbutamol or 500μg or less of terbutaline.

**Monetary benefit and utility valuations:**
Not relevant.

**Measure of benefit:**
The primary measure of benefit was asthma control.

Cost data:
The analysis included direct medical costs of health care resource use for asthma therapy, consultations, and hospitalisation. The costs were from national resources, such as the British National Formulary, the Personal Social Services Research Unit, NHS reference costs, and the Prescription Cost Analysis for the UK. The price year was 2007. All prices were provided in UK pounds sterling (£). Reflation was conducted, where necessary, and the methods were reported.

Analysis of uncertainty:
The uncertainty around estimates of cost-effectiveness was explored using bootstrapping. The results were presented on a cost-effectiveness plane.

Results
The mean total health care cost per patient who received a first prescription was £541 for metered dose inhaler (MDI), £550 for breath-actuated MDI (BAI) and £573 for dry powder inhaler (DPI). Compared with MDI, BAI cost an additional £9 and DPI an additional £32.

The percentage of patients with asthma controlled in this first prescription population was 75% for MDI, 76% (an additional 1.18% compared with MDI) for BAI, and 78% (an additional 2.05% compared with MDI) for DPI.

The likelihood that DPI was more cost-effective than MDI was 94%. The likelihood that BAI dominated MDI (was less costly and more effective) was 5%. DPs were consistently more effective and more costly than MDIs. The average incremental cost-effectiveness ratio (ICER) was £1,711 (95% CI 760 to 3,576).

The mean total health care cost per patient who received an increase dose was £671 for MDI, £672 for BAI and £744 for DPI. Compared with MDI, BMI cost an additional £1.05 and DPI an additional £72.

The percentage of patients with asthma controlled in the increased-dose population was 68% for MDI, 72% (an additional 3.66% compared with MDI) for BAI, and 70% (an additional 2.27% compared with MDI) for DPI.

The results of this analysis showed that there was a 48% chance that BAIs were dominant and a 4% chance of DPs being less effective and more costly than MDIs.

Authors' conclusions
The authors concluded that the real cost-effectiveness of inhaled corticosteroid inhalers might vary and the cost of the device as well as the potential health care resource use savings should be considered.

CRD commentary
Interventions:
The interventions were well described. The comparators under study appeared appropriate as they included alternatives available in current practice. It was unclear whether use of spacers should have been included, as they can influence the effectiveness of different modes of inhaled corticosteroid therapy.

Effectiveness/benefits:
The effectiveness data were derived from an observational database and may have been affected by confounding due to non-random allocation of treatment; the authors recognised this limitation and attempted to control for confounders statistically in the analysis. The observational data was large, but it was unclear how representative the practices that agreed to participate in the General Practice Research Database were. The level of reporting of the study methods was good. The authors aimed to evaluate the devices using data that reflected a real-world setting and achieved this by using the large observational dataset. The measure of effectiveness was a proxy measure constructed from patient records; the reader may wish to consider whether the proxy measure fully captured control of asthma.

Costs:
Costs relevant to the stated perspective were collected and included costs of therapy and medications, consultations and hospitalisations. Cost data and sources of unit costs were clearly reported in the text and tables. The sources of cost estimates were relevant to the study population and setting. Other details such as the price year and methods of adjustment were reported. Reporting of cost information was clear and transparent.

Analysis and results:
The analytical approach was reported satisfactorily and the results were presented fully. The way that the results were reported was a little confusing. ICER was derived for only one comparison. The presentation of probabilities was inconsistent across analyses. These minor limitations required the reader to focus on the tables of results alongside the narrative. Appropriate sensitivity analyses were performed and were reported fully. The overall level of reporting was adequate. Estimates of effectiveness and costs were fully reported. The authors recognised some of the limitations of their study.

Concluding remarks:
There were some limitations to this study, but the methods and reporting were satisfactory. The results appear to be reliable.

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