Use of dry powder inhalers in acute exacerbations of asthma and COPD  
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CRD summary
This review concluded that dry powder inhalers functioned equally as well as established therapies with other inhaler devices in patients with acute asthma or chronic obstructive pulmonary disease. Given poor reporting of the review process and uncertainty over the quality of the included studies, the authors' conclusions should be interpreted with caution.

Authors' objectives
To assess the efficacy of dry powder inhalers compared with established therapies delivered by pressurised metered dose inhalers (pMDI) or nebulizers in treatment of acute asthma and chronic obstructive pulmonary disease (COPD), irrespective of rapid-acting \( \beta_2 \)-agonist used.

Searching
MEDLINE, EMBASE, BIOSIS Previews, Current Contents and an internal AstraZeneca database (Planet) were searched for publications or congress abstracts to April 2008; search terms were reported. Reference lists were searched to identify additional articles.

Study selection
Clinical trials that evaluated rapid-acting \( \beta_2 \)-agonists in patients with asthma or COPD treated at emergency departments or hospitals that assessed exacerbation severity (measured as forced expiratory volume (FEV\(_1\)) percentage of predicted normal) were eligible for inclusion; included studies comprised randomised studies, open-label studies and investigational (methacholine challenge) studies that compared dry powder inhalers with other delivery devices. Treatments in the included studies included administration of fast-acting \( \beta_2 \)-agonists (terbutaline, salbutamol, formoterol, budesonide) via dry powder inhalers, most of which were Turbuhaler; these were compared with pMDIs (terbutaline, salbutamol) or nebulizers (terbutaline); one comparison additionally compared placebo. Studies that assessed salmeterol were excluded. Outcomes included improvements in lung function variously measured at different time points (up to 24 hours). Included studies were undertaken in adults and children (ages, where specified, ranged from six to 93 years). Where stated, baseline FEV\(_1\) ranged from 11% to 100% of predicted normal.

The authors stated neither how the papers were selected for review nor how many reviewers performed the selection.

Assessment of study quality
The authors did not state that they assessed validity.

Data extraction
The authors stated neither how the data were extracted for the review nor how many reviewers performed the data extraction.

Methods of synthesis
A narrative synthesis was reported.

Results of the review
A total of 15 studies was included in the review (n=856, range 12 to 112): 12 in acute asthma (eight double-blind randomised studies comprised six in adults and two in children); two open-label studies (one in adults and one in children) and two investigational (methacholine challenge) studies); and three in acute COPD (one double-blind and randomised, one single-blind and randomised and one open-label).

For patients with acute COPD exacerbations, comparable improvements in lung function were achieved for increasing doses of formoterol Turbuhaler and salbutamol pMDI (one study) and budesonide/formoterol Turbuhaler and
salbutamol pMDI and spacer (one study). In adults with acute asthma after four hours the increase in FEV$_1$ was significantly greater with formoterol via Turbuhaler compared with salbutamol via pMDI (43% versus 28%, $p=0.03$; one study), although a similar comparison of treatments found no significant difference at 15 or 45 minutes following administration (one study). For adults and children with acute asthma Turbuhaler was found to be as effective as either pMDIs (with or without a spacer; four studies) or a nebulizer (three studies). For children with acute asthma, drugs administered by Turbuhaler, pMDI or nebulizers yielded comparable improvements in lung function (two studies), which suggested that children from as young as six years of age can be effectively treated through use of dry powder inhalers. When bronchoconstriction was induced by methacholine challenge, investigational studies (two studies) found that either salbutamol, administered by either a DPI or pMDI, or formoterol, administered by Turbuhaler, were effective and fast-acting.

Authors' conclusions
Dry powder inhalers functioned equally well as established therapies with other inhaler devices in patients with acute asthma or COPD.

CRD commentary
The review addressed a clear question, although descriptions of inclusion criteria could have been more explicit with no criteria specified for outcomes. A number of electronic databases and relevant bibliographies were searched. It was unclear whether language restrictions were placed on the search and whether unpublished studies were sought, so some relevant trials may have been missed. The methods used for study selection and data extraction were not reported. Therefore, it was unclear whether methods were used to minimise the risks of reviewer error and bias. There was no formal assessment of quality of the included studies, which made it difficult to assess the reliability of the included data. More than half of the included studies were small and contained less than 60 participants. Given the apparent heterogeneity across studies, a narrative synthesis appeared appropriate. Given the poor reporting of the review process and uncertainty over the quality of the included studies, the authors' conclusions should be interpreted with caution.

Implications of the review for practice and research
Practice: The authors stated that administration of fast-acting bronchodilators through dry powder inhalers, mostly Turbuhaler, was effective during acute worsening of asthma or COPD.

Research: The authors did not state any implications for research.

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Record Status
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.