Management of acute exacerbations of COPD: a summary and appraisal of published evidence

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Authors' objectives
To critically review the available data on the diagnostic evaluation, risk stratification and therapeutic management of patients with acute exacerbations of chronic obstructive pulmonary disease (COPD).

Searching
MEDLINE (from 1966 to 2000), EMBASE (from 1974 to 2000), HealthSTAR (from 1975 to 2000) and the Cochrane Controlled Trials Register (Issue 1, 2000) were searched. Several search strategies that included the terms 'COPD' and 'acute exacerbations' were employed. The reference lists of retrieved articles were also checked.

Study selection
Study designs of evaluations included in the review
Randomised controlled trials (RCTs) were used, except for some treatment and diagnostic modalities where the lack or scarcity of RCTs meant that lower quality studies were considered.

Specific interventions included in the review
The diagnostic tests included were arterial blood gas sampling, chest roentgenography and spirometric testing. The interventions were bronchodilators (short-acting beta-agonists, anticholinergic inhaled bronchodilators and parenterally administered bronchodilators), corticosteroid drugs, antibiotics, oxygen therapy, mucus clearance strategies, physical and respiratory therapies, and noninvasive positive-pressure ventilation.

Reference standard test against which the new test was compared
The accuracy of the diagnostic procedures reviewed was judged according to the clinical status and progress of the patients.

Participants included in the review
Patients with acute exacerbations of COPD were included.

Outcomes assessed in the review
Due to the complex nature of this review many outcomes were reported. The outcomes relating to the diagnostic tests were not described clearly. Those for the variety of intervention classes included various measures of improvement, spirometry measurements and relapse time, and adverse effects.

How were decisions on the relevance of primary studies made?
The abstracts of relevant articles were reviewed against predetermined criteria and appropriate articles were retrieved. The authors do not state how many of the reviewers performed the selection.

Assessment of study quality
Each study was evaluated for internal and external validity, and scores were assigned and reported in the review. Details of the scoring methods were given in the paper. The authors do not state how the papers were assessed for validity, or how many of the reviewers performed the validity assessment.

Data extraction
The authors do not state how the data were extracted for the review, or how many of the reviewers performed the data extraction. The eligible studies were summarised in evidence tables. The data extracted included study methods, data and evidence for each study.
Methods of synthesis

How were the studies combined?
The studies were combined in a narrative review.

How were differences between studies investigated?
Within each section, differences between the studies were discussed.

Results of the review

The authors did not give an overall total number of studies. The number addressing each aspect of the review is given in the results section below.

There were no studies of arterial blood gas sampling. Three observational studies of chest roentgenography showed that a chest radiograph is a useful diagnostic test in emergency departments or hospitals. Spirometric testing (3 observational studies) was of limited usefulness at the time of presentation or during treatment.

There were 14 RCTs of bronchodilating agents, 6 placebo-controlled RCTs of corticosteroids and 11 placebo-controlled RCTs of antibiotics. Short-acting beta-agonists and anticholinergic inhaled bronchodilators have comparable effects on spirometry and a greater effect than all parenterally administered bronchodilators. A short course of systemic corticosteroids can improve spirometry and decrease the relapse rate. Antibiotics were beneficial, particularly in patients with more severe exacerbations.

No studies were cited to support the use of oxygen therapy, but there was a general acceptance of benefit. Four observational studies indicated that oxygen therapy may cause hypercarbia, but it is possible to identify the patients at risk.

Mucus clearance strategies (5 RCTs involving five different drugs) could possibly improve symptoms; there was no evidence to demonstrate that they can shorten the course of treatment.

Studies of physical and respiratory therapies (3 RCTs and 1 observational study) showed that mechanical percussion of the chest, as applied by physical/respiratory therapists, was ineffective and perhaps even detrimental.

Noninvasive positive-pressure ventilation (5 RCTs and 5 observational studies) was shown to be a beneficial support strategy. In selected hospitalised patients with respiratory failure it decreases the likelihood of requiring invasive mechanical ventilation and possibly improves survival time.

Authors' conclusions

The authors concluded 'Although suggestions for appropriate management can be made based on available evidence, the supporting literature is spotty'.

CRD commentary

This systematic review was very broad, covering all aspects of the management of acute exacerbations of COPD. Consequently, many of the details one might expect are not provided within the published paper. The criteria for selecting the papers for review, together with the quality assessment methods, were described adequately but the study details were minimal. The search strategy was adequate, although its restriction to English only articles may have resulted in the omission of some studies. Importantly, the quality assessment of the included studies appeared thorough and the results were reported in the review. Overall, the data presented appear to support the conclusions reached by the authors.

Implications of the review for practice and research

Practice: The authors state that therapies for which there is evidence of efficacy include bronchodilators, corticosteroids and noninvasive positive-pressure ventilation, and also antibiotics in severely ill patients. Mucolytics and
chest physiotherapy do not appear to be of benefit and oxygen supplementation may increase the risk of respiratory failure in an identifiable subgroup of patients.

Research: The authors state that further high-quality research is needed. This will require an improved, generally acceptable and transportable definition of the syndrome ‘acute exacerbation of COPD’ and improved methods for observing and measuring outcomes.

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