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[Intervention Review]

Airway clearance techniques for chronic obstructive pulmonary disease

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ABSTRACT

Background

Cough and sputum production are common in chronic obstructive pulmonary disease (COPD) and are associated with adverse clinical outcomes. Airway clearance techniques (ACTs) aim to remove sputum from the lungs, however evidence of their efficacy during acute exacerbations of COPD (AECOPD) or stable disease is unclear.

Objectives

To assess the safety and efficacy of ACTs for individuals with AECOPD and stable COPD.

Search methods

We searched the Cochrane Airways Group Specialised Register of trials from inception to October 2011, and PEDro in October 2009.

Selection criteria

We included randomised parallel trials and randomised cross-over trials which compared an ACT to no treatment, cough or sham ACT in participants with investigator-defined COPD, emphysema or chronic bronchitis.

Data collection and analysis

Two review authors independently conducted data extraction and assessed the risk of bias. We analysed data from studies of AECOPD separately from stable COPD, and classified the effects of ACTs as 'immediate' (less than 24 hours), 'short-term' (24 hours to eight weeks) or 'long-term' (greater than eight weeks). One subgroup analysis compared the effects of ACTs that use positive expiratory pressure (PEP) to those that do not.

Main results

Twenty-eight studies on 907 participants were included in the review. Study sample size was generally small (range 5 to 96 people) and overall quality was generally poor due to inadequate blinding and allocation procedures. Meta-analyses were limited by heterogeneity of outcome measurement and inadequate reporting of data.

In people experiencing AECOPD, ACT use was associated with small but significant short-term reductions in the need for increased ventilatory assistance (odds ratio (OR) 0.21, 95% confidence interval (CI) 0.05 to 0.85; data from four studies on 171 people), the duration of ventilatory assistance (mean difference (MD) -2.05 days, 95% CI -2.60 to -1.51; mean duration for control groups seven days; data from two studies on 54 people) and hospital length of stay (MD -0.75 days, 95% CI -1.38 to -0.11; mean duration for control groups nine days; one study on 35 people). Data from a limited number of studies revealed no significant long-term benefits of ACTs on the number of exacerbations or

hospitalisations, nor any short-term beneficial effect on health-related quality of life (HRQoL) as measured by the St. George's Respiratory Questionnaire (SGRQ) total score (MD -2.30, 95% CI -11.80 to 7.20; one study on 59 people).

In people with stable COPD, data from single studies revealed no significant short-term benefit of ACTs on the number of people with exacerbations (OR 3.21, 95% CI 0.12 to 85.20; one study on 30 people), significant short-term improvements in HRQoL as measured by the SGRQ total score (MD -6.10, 95% CI -8.93 to -3.27; one study on 15 people) and a reduced long-term need for respiratory-related hospitalisation (OR 0.27, 95% CI 0.08 to 0.95; one study on 35 participants).

The magnitude of effect of PEP-based ACTs on the need for increased ventilatory assistance and hospital length of stay was greater than for non-PEP ACTs, however we found no statistically significant subgroup differences. There was one report of vomiting during treatment with postural drainage and head-down tilt.

Authors' conclusions

Evidence from this review indicates that airway clearance techniques are safe for individuals with COPD and confer small beneficial effects on some clinical outcomes. Consideration may be given to the use of airway clearance techniques for patients with COPD in both acute and stable disease, however current studies suggest that the benefits achieved may be small.

PLAIN LANGUAGE SUMMARY

Airway clearance techniques for chronic obstructive pulmonary disease

Chronic obstructive pulmonary disease (COPD) is an umbrella term for chronic lung conditions characterised by airflow obstruction that cannot be fully reversed, such as emphysema and chronic bronchitis. Individuals with COPD often experience breathlessness, cough and sputum which may worsen during acute flare-ups. Airway clearance techniques (ACTs) are techniques that aim to clear sputum from the lungs. The usefulness of ACTs for individuals with acute flare-ups of COPD or stable COPD has been difficult to ascertain.

This review comprised 28 studies of 907 participants, with the quality of evidence being generally poor. Performing ACTs during an acute flare-up of COPD reduced the likelihood of needing mechanical assistance to breathe, as well as the length of time for which it was required. Time spent in hospital was slightly reduced, but there was little evidence to suggest any benefit on future flare-ups or health-related quality of life. Performing ACTs during stable COPD did not appear to affect flare-ups or hospitalisations, however it may improve health-related quality of life.

Techniques which involve breathing out against a positive expiratory pressure resistance may provide greater benefits than other types of ACTs. The lack of adverse events observed in this review suggests that ACTs are safe for individuals with COPD.