

A national survey: percussion, vibration, shaking and active cycle breathing techniques used in patients with acute exacerbations of chronic obstructive pulmonary disease

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Abstract

Objectives Chronic obstructive pulmonary disease (COPD) is a frequent cause of hospital admission in older people. There is a perception that manual chest physiotherapy techniques are commonly used in the treatment of patients admitted with acute exacerbations of COPD (AECOPD). However, it is not clear which chest physiotherapy techniques benefit patients admitted with AECOPD, or even which techniques are currently being employed. The aim of this study was to investigate the use of percussion, vibration, shaking and active cycle breathing techniques (ACBT) by physiotherapists working in respiratory care and treating patients admitted with AECOPD.

Design A postal questionnaire was used to survey physiotherapists working in respiratory care in 190 acute hospital trusts in the UK about chest clearance physiotherapy techniques used in the treatment of patients admitted with AECOPD.

Results Of the 190 questionnaires mailed, 146 (77%) complete responses were received. One hundred and twenty-nine (88%) respondents reported that they always or often used ACBT, compared with 38 (26%), 16 (11%) and 12 (8%) respondents for vibration, shaking and percussion, respectively. The differences were statistically significant: ACBT used always/often versus vibration used always/often ($\chi^2 = 5.8$, $P = 0.01$); ACBT used always/often versus percussion used always/often ($\chi^2 = 8.3$, $P < 0.0001$); and ACBT used always/often versus shaking used always/often ($\chi^2 = 6.7$, $P < 0.001$).

Conclusions Manual chest physiotherapy techniques (vibration, percussion and shaking) were used infrequently for chest clearance in patients admitted with AECOPD, whereas ACBT was used always or often by 88% of responders.

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Keywords: Active cycle breathing techniques; Percussion; Vibration; Shaking; COPD; Exacerbation; Chest physiotherapy

Introduction

In the UK, it is estimated that over 900 000 patients have a diagnosis of chronic obstructive pulmonary disease (COPD) [1]. Allowing for underdiagnoses, the true prevalence of COPD may exceed 1.5 million [1,2].

Acute exacerbations of COPD (AECOPD) are common and costly to treat. In addition, they are associated with an impaired quality of life [3] and impose a burden on family and caregivers. Severe exacerbations are a frequent cause of hospital admission, progressive decline in lung function [4,5] and a predictor of earlier death [6]. Symptoms may include

breathlessness, purulent sputum and increased sputum volume. It has been reported that increased sputum production is related to high levels of inflammatory markers, indicating increased airway inflammatory changes, such as increase in number of goblet cells and hypertrophy of mucus glands, at the time of exacerbation [7]. Patient recognition of exacerbation of symptoms and prompt intervention reduces the risk of hospitalisation and is associated with a better quality of life [8].

Physiotherapists have long been recognised as important healthcare professionals in providing such interventions to assist patients with chest clearance. Chest physiotherapy in this context can be defined as external application of a combination of forces to increase mucus transport. Physiotherapeutic techniques to aid sputum clearance may include

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active cycle breathing techniques (ACBT), percussion, vibration and shaking. ACBT is a cycle of techniques consisting of breathing control, lower thoracic expansion exercises and the forced expiration technique modifiable to individual patients. It assists bronchial clearance by enhancing mucociliary clearance whilst reducing adverse effects such as hypoxaemia or increased airflow obstruction [9]. Manual chest percussion is the rhythmic clapping on the chest wall with relaxed wrist and cupped hand, creating an energy wave that is transmitted to the airways. It is applied with a frequency of approximately 3–6 Hz. To reduce any adverse consequences, the technique should be performed for about 30 seconds and simultaneously with no more than three or four lower thoracic expansion exercises [10]. Vibrations are fine oscillations applied to the chest wall by the therapist's hands, and are carried out during expiration after a deep inspiration. Shaking is the production of coarse oscillations produced by the therapist's hands compressing and releasing the chest wall, and is also applied during the expiration phase.

A recent systematic review that investigated the effect of manual chest clearance techniques suggested that there is not enough evidence to support or refute their use in patients with COPD [11]. Furthermore, the recently published National Institute of Clinical Excellence (NICE) guidelines in COPD [1] regard the evidence for the benefit of physiotherapy techniques in this situation as Grade D, i.e. the evidence is based primarily on clinical experience and expert opinion. The former review led to a call for submission of proposals for further investigation by the UK Department of Health in 2003. However, at present, it is not clear which therapeutic techniques benefit patients admitted with AECOPD or, even more fundamentally, which techniques are currently being employed.

Hence, the aim of the current study was to survey physiotherapists working in respiratory care in acute hospitals in the UK about their use of percussion, vibration, shaking and ACBT when treating patients admitted with AECOPD.

Methods

Electronic searches were undertaken for English citations using the databases MEDLINE (1966–2006), AMED (1985–2006), CINAHL (1982–2006), EMBASE (1980–2006) and Ovid MEDLINE (R) (1996–2006). The following keywords were used: 'active cycle breathing techniques', 'percussion', 'vibration', 'shaking', 'COPD', 'exacerbation' and 'chest physiotherapy'. The reference lists of identified articles were checked for other potentially relevant articles, and appropriate respiratory books were also scrutinised.

A postal questionnaire was sent to physiotherapists working in respiratory care in 190 physiotherapy departments within acute hospital trusts that had previously taken part in a survey on pulmonary rehabilitation in the UK [12]. These comprise the vast majority of acute admitting hospitals in

the UK. The present data were collected in May 2003. Questionnaires were sent to the physiotherapy managers with a covering letter explaining the purpose of the study, asking for questionnaires to be distributed to the respiratory physiotherapists working with patients admitted with AECOPD, and requesting subsequent return of the questionnaires to the authors in the self-addressed envelope provided. A reminder letter was not sent to those who did not respond to the initial mailing.

Instrument

The evidence for using manual chest therapy in the treatment of patients with AECOPD is inconclusive [1,11]. The authors were interested in knowing which manual chest physiotherapy techniques were widely employed by physiotherapists in the treatment of patients admitted with AECOPD, and thus posed the following question: 'Which of the following chest clearance techniques do you use in the treatment of patients admitted with AECOPD? Please tick your preference of choice (technique) when treating patients with AECOPD'. Therapists were asked how frequently they used ACBT, vibration, percussion and shaking, and possible answers were 'always', 'often', 'sometimes', 'rarely' and 'never'. No enquiries were made about the decision-making process for the choice of technique(s) employed.

Statistical analysis

The data obtained in this survey questionnaire were nominal. Chi-squared test was performed to ascertain whether there were any statistically significant differences between the use of ACBT and the other chest therapy interventions. As no physiotherapists reported that they always employed percussion or shaking, the responses 'always' and 'often' were combined ('always/often') for analysis of the Chi-squared tests. Significance was set at $P < 0.05$.

Results

Of the 190 questionnaires mailed, 154 (81%) responses were received. Of these, 146 (77%) physiotherapists treated patients admitted with AECOPD and eight (4%) physiotherapists did not treat such patients. The subsequent analysis excludes the responses for the latter group.

Table 1 shows the number of physiotherapists employing chest clearance techniques in the treatment of patients admitted with AECOPD.

Seventy-nine (54%) physiotherapists always used ACBT, 50 (34%) often used ACBT, four (3%) always used vibration, and 34 (23%) often used vibration. No physiotherapists always employed percussion or always employed shaking when treating patients with AECOPD, but 12 (8%) physiotherapists often used percussion and 16 (11%) often used shaking. The majority of physiotherapists (66%) sometimes

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