

COPD Evidence Tables

The evidence tables are presented in section order.

The methodological quality of each paper was rated using the Scottish Intercollegiate Guidelines Network (SIGN) system (Scottish Intercollegiate Guidelines Network. SIGN 50 Guideline Developers Handbook, 2001; ID 19457):

++	All or most of the SIGN methodology checklist criteria were fulfilled. Where they have not been fulfilled the conclusions of the study or review are thought very unlikely to alter.
+	Some of the criteria were fulfilled. Those criteria that have not been fulfilled or not adequately described are thought unlikely to alter the conclusions.
-	Few or no criteria were fulfilled. The conclusions of the study are thought likely or very likely to alter.

**Chronic Obstructive Pulmonary Disease: Management of adults with
Chronic Obstructive Pulmonary Disease in Primary and Secondary
Care**

**Management of exacerbations of COPD
Respiratory Physiotherapy and exacerbations
Index**

Author	Publication Date	ID
Jones AP, Rowe BH. Bronchopulmonary hygiene physical therapy for chronic obstructive pulmonary disease and bronchiectasis (Cochrane Review). In: <i>The Cochrane Library</i> , Issue 2, 2003. Oxford: Update Software.	2002	1345
Bellone, A., Spagnolatti, L., Massobrio, M., Bellei, E., Vinciguerra, R., Barbieri, A., Iori, E., Bendinelli, S., & Nava, S. 2002, "Short-term effects of expiration under positive pressure in patients with acute exacerbation of chronic obstructive pulmonary disease and mild acidosis requiring non-invasive positive pressure ventilation", <i>Intensive Care Medicine</i> , vol. 28, no. 5, pp. 581-585.	2002	1342
McCrory, D. C., Brown, C., Gray, R. N., Goslin, R. E., MacIntyre, N. R., Kolimaga, J. T., Oddone, E. Z., & Matchar, D. 2001, <i>Management of acute exacerbations of chronic obstructive pulmonary disease.</i> , Agency for Healthcare Research and Quality., Rockville, MD, USA, 256.	2001	1145
Bellone, A., Lascioli, R., Raschi, S., Guzzi, L., & Adone, R. 2000, "Chest physical therapy in patients with acute exacerbation of chronic bronchitis: Effectiveness of three methods", <i>Archives of Physical Medicine & Rehabilitation</i> , vol. 81, no. 5, pp. 558-560.	2000	1338

Wollmer, P., Ursing, K., Midgren, B., & Eriksson, L. 1985, "Inefficiency of chest percussion in the physical therapy of chronic bronchitis", <i>European Journal of Respiratory Diseases</i> , vol. 66, no. 4, pp. 233-239.	1985	1344
Newton, D. A. & Bevans, H. G. 1978, "Physiotherapy and intermittent positive-pressure ventilation of chronic bronchitis", <i>British Medical Journal</i> , vol. 2, no. 6151, pp. 1525-1528.	1978	1341
Brown, P. A., Manfreda, J., McCarthy, D. S., MacDonald, S. (1987). The effect of mechanical vibration in patients with acute exacerbations of chronic obstructive pulmonary disease. <i>Physiotherapy Canada</i> , 39, 6, 371-374.	1987	1497

Author / Title / Reference / Yr	Jones AP,. Rowe BH. Bronchopulmonary hygiene physical therapy for chronic obstructive pulmonary disease and bronchiectasis (Cochrane Review). <i>The Cochrane Library.Oxford: Update Software 2003;Issue 3</i> . Ref ID 1345
N=	N=7 RCTs. N=126 people. Locations=Canada, UK, USA and Sweden
Research Design	Systematic Review and meta analysis (includes RCTs with or without blinding).
Aim	To assess the effects of bronchial hygiene physical therapy in people with COPD and bronchiectasis.
Operational Definition	Operational definition of COPD not given. Exacerbation definition not given. Severity of COPD not specified.
Population	Stable and exacerbation COPD population mixed. Bronchiectasis. Cystic fibrosis (N=4 patients). Asthma (N=1 pt) In patients and out patients.
Intervention	Manual interventions such as postural drainage, chest percussion, vibration, chest shaking, directed coughing or forced exhalation technique.
Comparison	No intervention, placebo, coughing, mechanical interventions such as positive pressure and mechanical vibration.
Outcome	Pulmonary function, blood gases, pulmonary clearance (sputum production, radio aerosol clearance), adverse reactions, symptoms (dyspnoea), general outcomes (such as resolution of CXR, mortality, length of hospital stay).
Characteristics	Age range: Bateman (1981) age unspecified, May (1979) 37 to 83 years, mean 59yrs, Mohsenifar (1985) 47 to 83 yrs, mean 69yrs, Newton (1978) age unspecified, Oldenburg (1979) 55 to 70 yrs, mean 62 yrs, Olseni (1994) age mean 57

	yrs, Sutton (1983) 19 to 60, mean 41 yrs.
Results	<p>Authors state “Trials were small and not generally of high quality. The results could not be combined as trials addressed different pt groups and outcomes. In most comparisons, bronchial hygiene physical therapy produced no significant effects on pulmonary function, apart from clearing sputum in COPD and bronchiectasis”.</p> <p>The only trial that had a situation specific population of acute exacerbations of COPD was Newton (1978). This trial has been critically appraised separately and an Evidence Table compiled, see ID 1341.</p>
SIGN Quality Rating	-
Hierarchy of Evidence Grading	1a
Studies included	Bateman 1981 (N=6, stable disease), May 1979 (N=35, stable disease), Mohsenifar 1985 (N=20, stable disease), Newton 1978 (N=33, exacerbations), Oldenburg 1979 (N=8, chronic bronchitis), Olseni 1994 (N=14, outpatients with chronic bronchitis), Sutton 1983 (N=10, bronchiectasis, cystic fibrosis, asthma).
Studies excluded	Agoston (1968), Ambrosino (1981), Anthonisen (1964), Belcastro (1984), Boksha (1989), Boye 1994), Castillo (1985), Cegla (1993 & 1994), Christensen (1990 & 1991), Clark (1986), Conway (1992), Craven (1974), Edenbrandt (1990), Feldman (1979), Foglio (1992), Gallon (1991), Hansen (1990), Hasani (1991), Kraszko (1973), Lorin (1971), Luttman (1994), Marcq (1981), Mazzoco (1985), Nichols (1970), Pavia (1976), Peterson (1976), Pryor (1979), Rivington (1984), Sutton (1985), Toevs (1984), Tonnesen (1982), Vandschans (1986 & 1990), Vanhengstum (1988 & 1991), Wollmer (1985).
NCC CC ID	1345

Author / Title / Reference / Yr	Bellone, A., Spagnolatti, L., Massobrio, M., Bellei, E., Vinciguerra, R., Barbieri, A., Iori, E., Bendinelli, S., & Nava, S. 2002, "Short-term effects of expiration under positive pressure in patients with acute exacerbation of chronic obstructive pulmonary disease and mild acidosis requiring non-invasive positive pressure ventilation", <i>Intensive Care Medicine</i> , vol. 28, no. 5, pp. 581-585. Ref ID: 1342
N=	N=27 Site=Respiratory intensive care unit. Location= Italy Duration=2/12
Research Design	Prospective, randomised, controlled study.
Aim	To investigate the feasibility and the efficacy of expiration under positive pressure as a chest physiotherapy
Operational Definition	ATS criteria were used to define COPD Acute exacerbation of COPD was defined on the basis of the clinical history, physical examination and CXR
Population	Pts with acute exacerbations of COPD
Intervention	N=13 PEP mask plus assisted coughing. PEP physiotherapy consisted of three daily sessions of 30-40 min each for the first 3/7 from the beginning of NIPPV. After 1 hr from the beginning of NIPPV, pts were randomly allocated to PEP mask plus assisted coughing or assisted coughing alone (as per the comparison group).
Comparison	N=14 Assisted coughing
Outcome	Primary – Compare total sputum wet weight and to assess the feasibility of the PEP mask. Secondary – Time required for weaning pts from NIPPV / treatment failure expressed as mortality within 2/12 after discharge from the ICU.
Characteristics	Mean age 65yrs / Gender 63% male / Mean APACHE II= 17 / Blood gases pH between 7.25 to 7.35 (Mean 7.33) / PaO ₂ 6.9 PaCO ₂ 9.8kPa / Maintenance of SaO ₂ >85% / FEV1 intervention group 935(m), control group 858 (m) / FEV1/VC % 39
Results	Sputum production Significantly higher in the PEP mask plus assisted coughing group (10g) compared to the control group (5g) of assisted coughing alone (p<0.01). Mask comfort Only two pts referred to discomfort but did not stop treatment Weaning time from NIPPV Significantly lower in the intervention group (5 days) compared to the control group (7 days) (p<0.01) Mortality No significant differences End tracheal intubation No significant differences

SIGN Quality Rating	+
Hierarchy of Evidence Grading	1b
NCC CC ID	1342

Author / Title / Reference / Yr	McCrary, D. C., Brown, C., Gray, R. N., Goslin, R. E., MacIntyre, N. R., Kolimaga, J. T., Oddone, E. Z., & Matchar, D. 2001, <i>Management of acute exacerbations of chronic obstructive pulmonary disease.</i> , Agency for Healthcare Research and Quality., Rockville, MD, USA, 256. Ref ID: 1145
N=	N=3 RCTs
Design	Systematic Review / Technology Assessment
Aim	To assess the efficacy of physical therapy for pts with acute exacerbations of COPD
Population	Acute exacerbations of COPD
Intervention and Comparisons	<p>Direct cut and paste quote:</p> <ul style="list-style-type: none"> • “Three RCTs of chest physiotherapy were included (Newton and Bevans, 1978; Petersen, Esmann, Høncke, et al., 1967; Wollmer, Ursing, Midgren, et al., 1985) . • A fourth study in a group of patients with acute exacerbation of COPD did not report suitable outcome data (only blood gases, temperature, and sputum production) (Anthonisen, Riis, and Sjøgaard Andersen, 1964). • Three other controlled trials of various physical therapy modalities were conducted in patients who were not in acute exacerbation (Maloney, Fernandez, and Hudgel, 1981; van Hengstum, Festen, Beurskens, et al., 1990; van Hengstum, Festen, Beurskens, et al., 1991) or who were in post exacerbation (Kirsten, Taube, Lehnigk, et al., 1998).”
SIGN Quality Rating	++
Hierarchy of Evidence Grading	1a
Results	<p>Direct cut and paste quote:</p> <ul style="list-style-type: none"> • “Efficacy - None of the included trials reported any benefit over control for ventilatory function (FEV₁ or FVC). One trial described a significantly lower FEV₁ in patients who received chest percussion therapy compared with control (Wollmer, Ursing, Midgren, et al., 1985). A similar transient decrease in FEV₁ following chest percussion was previously described in an uncontrolled study (Campbell, O’Connell, and Wilson, 1975). • Adverse effects. Other than the data on short-term decrease in FEV₁ immediately following chest physiotherapy, no other information on adverse effects was provided. • Summary. Available studies of chest physiotherapy fail to show any improvement in short-term ventilatory

	function for patients with acute exacerbation of COPD.”
ID	1145

Author / Title / Reference / Yr	Bellone, A., Lascioli, R., Raschi, S., Guzzi, L., & Adone, R. 2000, "Chest physical therapy in patients with acute exacerbation of chronic bronchitis: Effectiveness of three methods", <i>Archives of Physical Medicine & Rehabilitation</i> , vol. 81, no. 5, pp. 558-560. Ref ID: 1338
N=	N=10. Site=Clinical ward. Location=Italy. Duration=1 hour
Research Design	Prospective, randomised study (no control hence quasi experimental)
Aim	To compare the short term effects of postural drainage (PD), oscillating positive expiratory pressure (using the FLUTTER device), and expiration with the glottis open in the lateral posture (ELTGOL)
Operational Definition	Chronic bronchitis defined as cough daily and expectoration for at least 3/12 for the last 2 yrs, who were known to produce more than 30ml sputum per day. Acute exacerbation was defined as the appearance of mucopurulent or purulent sputum and increasing cough, and one or more of the following symptoms: temperature of >38°C, general malaise, increased dyspnoea, increased mucus production, or thickness or increased difficulty in expectoration.
Population	Pts with an acute exacerbation of chronic bronchitis.
Intervention	Each pt received FLUTTER, ELTGOL and PD. Each pt received each treatment by the same respiratory therapist at the same time of day on separate days in random order.
Comparison	No control
Outcome	O2 saturation, pulmonary function and sputum production
Characteristics	Age range 47 to 64 yrs (mean 58 yrs) / No other demographics available.
Results	O2 saturation - No significant difference in SaO2 FEV1 - No significant difference in FEV1 during treatments Sputum production 30 minutes after treatment: FLUTTER 9.5g to 15.0g, p<0.01 / ELTGOL 10.3g to 17.0g, p<0.01 / PD 9.3g to 15.5g, p<0.01 1 hour after treatment: FLUTTER 15g to 19g, p<0.01 / ELTGOL 17g to 21g, p<0.02 / PD 16g to 17g, not significant.
SIGN Quality Rating	-
Hierarchy of Evidence Grading	11b
NCC CC ID	1338

Author / Title / Reference / Yr	Wollmer, P., Ursing, K., Midgren, B., & Eriksson, L. 1985, "Inefficiency of chest percussion in the physical therapy of chronic bronchitis", <i>European Journal of Respiratory Diseases</i> , vol. 66, no. 4, pp. 233-239. Ref ID: 1344
N=	N=10 Site=Not specified. Location=Sweden. Duration=2 days.
Research Design	Randomised, cross over study.
Aim	To evaluate the effect of chest percussion by comparing chest physiotherapy (postural drainage, instructed coughing) with and without chest percussion.
Operational Definition	COPD not defined. Exacerbation not defined. Severity not defined.
Population	Pts recovering from an acute exacerbation of chronic bronchitis. All pts had been admitted to hospital because of an acute exacerbation of bronchitis and were studied after a few days of treatment.
Intervention	Chest percussion and (postural drainage, instructed coughing) vs no percussion. Postural drainage = 5 mins in each of 3 positions (supine, right and left decubitus). Chest percussion administered by physio and continued throughout the postural drainage. Each period of postural drainage was followed by instructed coughing
Comparison	All pts were studied twice on consecutive days (no standard control group).
Outcome	Spirometric parameters, deposition of inhaled particles, O2 saturation and clearance of inhaled radio labelled particles.
Characteristics	Mean age 72 yrs 6 men and 4 women FEV1 42 +/- 16% of predicted. Concomitant medication bronchodilator drugs and some pts were receiving steroids (no further details given).
Results	Percussion Physiotherapy including chest percussion was associated with a statistically significant decrease in FEV1, percussion omitted -0.5 +/- 8.0 vs percussion included -7.3 +/- 6.5; p<0.01. Time parameter for when this was measured post treatment is not documented. Deposition or clearance of inhaled radio labelled particles -There was no difference between the two groups. O2 saturation - No significant differences
SIGN Quality Rating	-
Hierarchy of Evidence Grading	11b
NCC CC ID	1344

Author / Title / Reference / Yr	Newton, D. A. & Bevans, H. G. 1978, "Physiotherapy and intermittent positive-pressure ventilation of chronic bronchitis", <i>British Medical Journal.</i> , vol. 2, no. 6151, pp. 1525-1528. Ref ID: 1341
N=	N=79. Site=Pts admitted to one UK hospital, no other site specified. Location=UK. Duration= Up to 3/12
Research Design	Randomised controlled trial
Aim	Not specified
Operational Definition	An acute exacerbation of bronchitis was defined as an increase in cough, phlegm or breathlessness for >24hrs occurring in a pt with chronic bronchitis. No other definitions given.
Population	Pts admitted to hospital with exacerbation of chronic bronchitis alone or in association with cor pulmonale, pneumonia or respiratory failure. Groups stratified pre randomisation for: Men with hypoxia (Group 1) N=27 Men without hypoxia (Group 2) N=36 Women (Group 3) N=16
Intervention	Standard drug treatment plus physiotherapy and intermittent positive pressure ventilation (IPPV). Physiotherapy was given 3 times daily for 10-15 minutes "in a standard fashion by means of conventional methods" which is not defined. IPPV was given at 9a.m. by a physiotherapist and at 14:00 & 18:00 by a nurse. "BIRD ventilation".
Comparison	Standard drug treatment
Outcome	FEV1 / Blood gases / Sputum volume / morbidity and mortality during hospital stay and within 3/12 of discharge / duration of hospital stay
Characteristics	Pts were excluded if they had significant co-morbidity / simple bronchitis with mucus hyper secretion but no airflow obstruction (FEV1/VC <70% predicted, and in this study FEV1 <50% predicted). Age range un specified.
Results	PaO2 & FEV1 - No significant differences occurred between the controls and pts receiving physiotherapy and IPPV. Sputum volumes – The only significant difference found was in those patients receiving physiotherapy in group 1 who produced more sputum in the last three days in hospital than their respective controls (p<0.05). Morbidity in hospital – No significant differences Mortality in hospital – No significant differences Duration of hospital stay – No significant differences
SIGN Quality Rating	-
Hierarchy of Evidence Grading	1b
NCC CC ID	1341

Author / Title / Reference / Yr	Brown, P. A., Manfreda, J., McCarthy, D. S., MacDonald, S. (1987). The effect of mechanical vibration in patients with acute exacerbations of chronic obstructive pulmonary disease. <i>Physiotherapy Canada</i> , 39, 6, 371-374.
N=	N= 24 participants Location= Physiotherapy at the Respiratory Hospital, Health Sciences Centre, Canada Sites=1
Research Design	RCT randomised cross-over trial.
Aim	To assess the efficacy of mechanical vibration in patients with acute exacerbations of chronic obstructive pulmonary disease.
Operational Definition	In and out patients with <ul style="list-style-type: none"> • a chronic productive cough with sputum expectoration of 30 ml or greater in 24 hours. • an acute episode of pneumonia determined by chest x-ray, or exacerbation of COPD with an increased sputum expectoration of 30ml or greater in 24 hours. An exacerbation was defined according to Stenhouse as an increase in the quantity or purulence of sputum.
Population	Patients with acute exacerbations of chronic obstructive pulmonary disease.
Intervention	Vibration N=24 Intervention: All patients were in a sitting position, leaning forward with elbows supported on a table and head resting on a pillow. Vibration was administered to the chest wall over laying the affected segment for 15 minutes using the Wahl vibrator (model 4300). The vibrator was applied with firm pressure and moved to adjacent areas at approximately 30-second intervals thereby covering the required surface area. If more than one segment was involved, the time was increased accordingly. Patients were not given specific instructions regarding breathing exercises or coughing frequency. They were instructed to expectorate sputum following spontaneous coughing.
Comparison	Positioning alone N=24 Cross-over occurred for positioning alone 24 hours later.
Outcome	<ul style="list-style-type: none"> • FEV1 • FVC • SaO₂ • FEV1, FVC and oxygen saturation were recorded at 5 minutes, 30 minutes, and 1 and 24 hours post procedure. Sputum was collected in measured containers and the volume was recorded at 60 minutes post procedure and 24 hours following the procedure.
Characteristics	<ul style="list-style-type: none"> • Males/females= 71%/29% • Mean age= 66.5yrs • FEV1 % predicted= 33.4 • FVC % predicted= 57.4

	<ul style="list-style-type: none"> • FEV1/FVC= 49.1 • Usual 24hrs sputum (ml)= 65
Results	<p>FEV1 and FVC No significant difference was found in the FEV1 and FVC, at any one of the time intervals recorded, after patients had received the vibration and on the control day when they maintained positioning without any intervention.</p> <p>Sputum volume At the 60 minute time interval, significantly more volume of sputum was recorded following vibration than on the control day when they received positioning alone (p<0.05). Sputum volumes expectorated within 24 hours were not significantly different between treatment and control days.</p> <p>SaO₂ The oxygen saturation values for all subjects are not significantly different between vibration and control days at any of the time intervals including pre-treatment measurements. However, when patients on room air were separated from those on supplemental oxygen, there was a significantly greater oxygen saturation post vibration than post positioning at 30 minutes in the group receiving supplemental oxygen (p<0.05). There was no difference in oxygen saturation at 60 minutes following vibration in comparison with positioning for either room air patients or patients with supplemental oxygen.</p>
SIGN Quality Rating	+
Hierarchy of Evidence Grading	Ib
NCC CC ID	1497