

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

**Managing Stable COPD
Physiotherapy
Index**

Author	Publication Date	ID
Casciari, R. J., Fairshter, R. D., & Harrison, A. 1981, "Effects of breathing retraining in patients with chronic obstructive pulmonary disease", <i>Chest</i> , vol. 79, no. 4, pp. 393-398.	1981	1645
Rivington-Law, B. A., Epstein, S. W., Thompson, G. L., & Corey, P. N. 1984, "Effect of chest wall vibrations on pulmonary function in chronic bronchitis", <i>Chest</i> , vol. 85, no. 3, pp. 378-381.	1984	1353
Mohsenifar, Z., Rosenberg, N., Goldberg, H. S., & Koerner, S. K. 1985, "Mechanical vibration and conventional chest physiotherapy in outpatients with stable chronic obstructive lung disease", <i>Chest</i> , vol. 87, no. 4, pp. 483-485.	1985	1655
Tiep, B. L., Burns, M., Kao, D., Madison, R., & Herrera, J. 1986, "Pursed lips breathing training using ear oximetry", <i>Chest</i> , vol. 90, pp. 218-221.	1986	1659
Kolaczowski, W., Taylor, R., & Hoffstein, V. 1989, "Improvement in oxygen saturation after chest physiotherapy in patients with emphysema", <i>Physiotherapy Canada</i> , vol. 41, no. 1, pp. 18-23.	1989	1652
Christensen, E. F., Nedergaard, T., & Dahl, R. 1990, "Long-term treatment of chronic bronchitis with positive expiratory pressure mask and chest physiotherapy", <i>Chest</i> , vol. 97, pp. 645-650.	1990	1651

Van Hengstum, M., Festen, J., Beurskens, C., Hankel, M., Beekman, F., & Corstens, F. 1991, "Effect of positive expiratory pressure mask physiotherapy (PEP) versus forced expiration technique (FET/PD) on regional lung clearance in chronic bronchitis", <i>European Respiratory Journal</i> , vol. 4, no. 6, pp. 651-654.	1991	1660
Olsen, L., Midgren, B., Hornblad, Y., & Wollmer, P. 1994, "Chest physiotherapy in chronic obstructive pulmonary disease: Forced expiratory technique combined with either postural drainage or positive expiratory pressure breathing", <i>Respiratory Medicine</i> , vol. 88, no. 6, pp. 435-440.	1994	1656
Kurabayashi, H., Machida, I., Tamura, K., Iwai, F., Tamura, J., & Kubota, K. 2000, "Breathing out into water during subtotal immersion: A therapy for chronic pulmonary emphysema", <i>American Journal of Physical Medicine & Rehabilitation</i> , vol. 79, no. 2, pp. 150-153.	2000	1654
Savci, S., Ince, D. I., & Arıkan, H. 2000, "A comparison of autogenic drainage and the active cycle of breathing techniques in patients with chronic obstructive pulmonary diseases", <i>Journal of Cardiopulmonary Rehabilitation</i> , vol. 20, no. 1, pp. 37-43.	2000	1658

Author / Title / Reference / Yr	Casciari, R. J., Fairster, R. D., & Harrison, A. 1981, "Effects of breathing retraining in patients with chronic obstructive pulmonary disease", <i>Chest</i> , vol. 79, no. 4, pp. 393-398. Ref ID: 1645
N=	N=22 Duration=6 & 9 wks. Location=USA. Sites=Number of sites not specified. Outpatients.
Research Design	Controlled study without randomisation
Aim	To evaluate the relative contributions of somatic (exercise) reconditioning and BRT in a pulmonary rehabilitation program.
Operational Definition	Physician diagnosed severe COPD.

	<p>FEV1 < 1.2L and 50% predicted. FEV1/FVC < 50%. Improvement in FEV1 by < 20% post administration of aerosolised metaproterenol sulfate.</p> <p>Exercise reconditioning consisted of a program of treadmill exercise performed three times weekly for 6wks. An exercise period would last one hr (30 mins exercising and 30 mins resting).</p> <p>Breathing retraining (six steps fully described) continued for 3wks in all group 1 subjects</p>
Population	N=22 severe COPD
Intervention	Group 1. N=10. 6 wks of exercise training and 3wks of breathing retraining (BRT)
Comparison	Group 2. N=12. 9wks of exercise reconditioning (ER)
Outcomes	Pulmonary function and exercise tests.
Characteristics	<p>Gender – 18 males and 4 females</p> <p>Average age 59 years</p> <p>Baseline FEV1 L - Group 1= 0.66 +/-0.31. Group 2 = 0.68 +/- 0.25.</p> <p>Baseline FEV1/FVC% - Group 1 = 27.4 +/-7.4. Group 2 29.6 +/- 9.9</p>
Results	<p>Exercise Performance</p> <p>There were no significant differences between the two groups in estimated V_{O_2} at baseline or after 6 wks of ER. In the last 3 wks of the program, the increment in estimated V_{O_2} was significantly higher in the BRT participants (group 1) than in the controls (group 2). (p<0.002).</p> <p>Ventilatory Studies</p> <p>During maximal exercise, the respiratory rate decreased from 32.6 +/- 7.5 breaths/min (baseline) to 30.3 +/- 9.4 breaths /min (bpm) after ER (p=NS) to 23.8 +/- 5.7 bpm after BRT (p<0.05).</p> <p>Tidal volume (V_T) during exercise increased from 800 ml at baseline to 910 ml after EF (p=NS) to 1,320 ml after BRT (p<0.05).</p> <p>During exercise, PaO₂ increased between ER and BRT (p<0.01).</p> <p>After 9 wks PaO₂ and base excess differed significantly (level of significant not specified) in groups 1 and 2.</p> <p>PaO₂ (mm Hg)</p> <p>BRT 77.5 +/-8.5 compared to control group 60.0 +/- 11.5</p> <p>Base Excess (mEq/L)</p> <p>BRT -5.5 +/- 3.8 compared to control group -2.3 +/- 3.2</p> <p>Heart Rate</p> <p>No significant differences detected.</p> <p>Discussion section</p> <p>“The increment in work performance during the final three wks of the program was significantly higher in the group that received BRT (p<0.002). Data indicate that compared with controls, exercise performance increased significantly in the group of COPD subjects receiving breathing retraining”.</p>
SIGN Quality Rating	+
Hierarchy of Evidence	11a

Grading	
NCC CC ID	1645

Author / Title / Reference / Yr	Rivington-Law, B. A., Epstein, S. W., Thompson, G. L., & Corey, P. N. 1984, "Effect of chest wall vibrations on pulmonary function in chronic bronchitis", <i>Chest.</i> , vol. 85, no. 3, pp. 378-381. Ref ID: 1353.
N=	N=12 Location=Canada Sites=One Duration=3/7
Research Design	RCT (cross over design) Experimental design where the factors of three different days and three different treatments were randomised and balanced.
Aim	To investigate the effects of manual chest wall vibrations on pulmonary function and oxygen saturation in pts with chronic bronchitis
Operational Definition	ATS classification for chronic bronchitis
Population	N=12 stable chronic bronchitis
Intervention	Deep breathing exercises with vibrations (Day 2) (15 minute period of deep breathing exercises with the addition of chest wall vibrations)
Comparison	Deep breathing exercises (Day 1) (15 minute period of deep breathing) No treatment (Day 3) (Rested for 15 minutes)
Outcome	Functional residual capacity (FRC), expiratory reserve volume (ERV), residual volume (RV) and arterial oxygen saturation (SaO ₂)
Characteristics	Age range 48 to 80 yr (mean 66yrs) / Gender – 11 males / 1 female / Bronchodilators withheld for 8 hrs prior to the study. Lung severity not specified
Results	ERV: There was a significant decrease in the ERV immediately following the deep breathing exercises alone that remained constant after the 15-minute rest period (p=0.032). There were no other significant differences (changes were ascribed to therapy only if they were significantly different among the three treatment days).
SIGN Quality Rating	-
Hierarchy of Evidence Grading	1b
NCC CC ID	1353

Author / Title / Reference / Yr	Mohsenifar, Z., Rosenberg, N., Goldberg, H. S., & Koerner, S. K. 1985, "Mechanical vibration and conventional chest physiotherapy in outpatients with stable chronic obstructive lung disease", <i>Chest</i> , vol. 87, no. 4, pp. 483-485. Ref ID: 1655
N=	N=20 Location=USA Sites=Participants selected sequentially from those referred to a pulmonary rehabilitation program. Duration=Measures taken at 20 and 40 minutes after treatment.
Research Design	RCT
Aim	To evaluate and compare the effects of standard chest physiotherapy and mechanical chest vibration on stable outpatients with chronic airflow limitation and moderate sputum production (<30ml / 24 hrs)
Operational Definition	Nil given
Population	N=20 stable outpatients with severe chronic obstructive lung disease. Mean FEV1/FVC ratio of 30% and moderate sputum production (30ml/24hrs)
Intervention	Chest physiotherapy for 20 minutes
Comparison	Mechanical vibration for 20 minutes
Outcome	Arterial blood gas, spirometry and sputum production
Characteristics	Mean age chest physio group =67 yrs (range 62 to 83yrs) and mechanical vibration group 70 yrs (range 59 to 78 yrs). None of the pts had significant reversibility on resting pulmonary functions. Similar numbers in each group receiving bronchodilators. Pts with co existing medication problems were excluded.
Results	No significant differences between the groups were detected for any outcome.
SIGN Quality Rating	-
Hierarchy of Evidence Grading	1b
NCC CC ID	1655

Author / Title / Reference / Yr	Tiep, B. L., Burns, M., Kao, D., Madison, R., & Herrera, J. 1986, "Pursed lips breathing training using ear oximetry", <i>Chest</i> , vol. 90, pp. 218-221. Ref ID: 1659
N=	N=12 Location=USA Site=Not specified Duration=Point at which outcomes were measured not specified.
Research Design	RCT with ABA crossover study design.
Aim	To examine the use of ear oximetry in conjunction with pursed lips breathing to improve SaO2 while also investigating the concomitant response of tidal volume and respiratory rate.

Operational Definition	Not specified
Population	N=12 hypoxemic participants with stable chronic obstructive lung disease (COLD).
Intervention	N=6 Pursed lip group using oximeter monitor SaO2 response to participant effort feedback. Feedback given by instructor re technique whilst watching ear oximeter digital readout.
Comparison	N=6 Relaxation group
Training sessions	Each training session lasted for 15 minutes. Total number of session not specified (although authors state that an ABA crossover design was used – not specified whether this was for one session?). A chart recorder provided a continuous write out of SaO2 and respiratory mechanics but it is not clear how the outcome data was derived from this (? average of total time recording for outcome of interest, hence not possible to state time duration for outcome measurements (short term only though)).
Outcome	SaO2 monitored by ear oximetry, respiratory rate and tidal volume
Characteristics	Mean age 67 yrs FEV 1.75 +/- 9L; FEV1 0.75 +/- 0.4 L, SaO2 91.1 +/- 2.5% All participants were on a stable regimen of medication. Not allowed to take inhaled bronchodilators within one hr of the study.
Results	SaO2 In both groups pursed lips breathing significantly improved SaO2 over relaxation and baseline values (p<0.001). Relaxation did not significantly improve SaO2 over baseline. The increase in SaO2 from pursed lips breathing lasted only as long as the subject was performing the exercise. Within ten minutes of discontinuing pursed lips breathing, the SaO2 in every participant returned to baseline. Tidal volume and respiratory rate Pursed lips breathing was accompanied by both a significant increase in mean tidal volume (p<0.01) and a significant decrease in mean respiratory rate (p<0.001). Mean minute volume There was no significant difference in the mean minute volume between the two groups or within the same groups.
SIGN Quality Rating	-
Hierarchy of Evidence Grading	1b
NCC CC ID	1659

Author / Title / Reference / Yr	Kolaczowski, W., Taylor, R., & Hoffstein, V. 1989, "Improvement in oxygen saturation after chest physiotherapy in patients with emphysema", <i>Physiotherapy Canada</i> , vol. 41, no. 1, pp. 18-23. Ref ID: 1652
N=	N=15 patients with emphysema. N=6 matched controls. Duration=One 15 min session of physiotherapy or sham session. O2 saturation monitored for 45 minutes after treatment. Location=Canada. Sites=Not specified although suggestive of one site as all participants were treated by the same therapist.

Research Design	Cohort (Matched control, no randomisation)												
Aim	To examine the effect of an alternative method of physiotherapy which was not directed toward elimination of secretions, on oxygen saturation, pulmonary function and thoracic mobility in pts with emphysema.												
Operational Definition	Nil given "The subjects and controls had moderately severe airway obstruction".												
Population	N=21 male patients with stable emphysema												
Intervention	N=15 given physiotherapy treatment aimed at patient relaxation, improvement in mobility of the thorax and assistance with respiration. (Techniques utilised fully described).												
Comparison	N=6 age matched controls with stable emphysema given a sham session designed to imitate the changes in body position assumed by the pts in the treatment group but with no physiotherapy.												
Outcomes	Oxygen saturation, pulmonary function and chest expansion.												
Characteristics	Age range 45 to 81 yrs "All results are expressed as % of predicted normal values" no other SI units provided: <table border="1"> <thead> <tr> <th>(Mean)</th> <th>Treatment group</th> <th>Control group</th> </tr> </thead> <tbody> <tr> <td>FVC</td> <td>65</td> <td>71</td> </tr> <tr> <td>FEV1</td> <td>39</td> <td>40</td> </tr> <tr> <td>FEV1/FVC</td> <td>61</td> <td>58</td> </tr> </tbody> </table>	(Mean)	Treatment group	Control group	FVC	65	71	FEV1	39	40	FEV1/FVC	61	58
(Mean)	Treatment group	Control group											
FVC	65	71											
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FEV1/FVC	61	58											
Results	<p>O2 saturation Differences between the two groups not specified. After the physiotherapy treatment participants increase oxygen saturation from the baseline value of (mean +/- SD) 88 +/- 4% to 93 +/- 4% at 45 minutes post physiotherapy (p<0.0001). Almost all of the increase occurred immediately after the physiotherapy. In the control group there was no significant difference in O2 saturation during the observation period.</p> <p>Pulmonary function No significant difference in FVC or FEV1 before & after physiotherapy (treatment group) or before & after the sham session in the control group.</p> <p>Chest expansion (Mean and +/- SD) increased from 2.5 +/- 0.9cm prior to physiotherapy to 4.1 +/-1.2 cm post physiotherapy (p<0.0001). In the control group there were no differences.</p>												
SIGN Quality Rating	-												
Hierarchy of Evidence Grading	11a												
NCC CC ID	1652												

Author / Title / Reference / Yr	Christensen, E. F., Nedergaard, T., & Dahl, R. 1990, "Long-term treatment of chronic bronchitis with positive expiratory pressure mask and chest physiotherapy", <i>Chest</i> , vol. 97, pp. 645-650. Ref ID: 1651																		
N=	N=44 (N=43 completed). Duration of follow up =12 months. (In addition to this, N=10 were included for 4 to 5 months). Location=Denmark. Site=Outpatients																		
Research Design	RCT																		
Aim	To compare the prophylactic effect of diaphragmatic breathing and forced expirations with and without PEP-mask in the home treatment of patients with chronic bronchitis. Pts were instructed to use either treatment every morning and evening for 10 to 15 breaths repeated until expectoration had stopped.																		
Operational Definition	Chronic bronchitis defined as "cough, daily and expectoration for at least three consecutive months for the last two years".																		
Population	Chronic bronchitis																		
Intervention	N=20 PEP. Diaphragmatic breathing performed through a PEP mask followed by forced expirations and cough.																		
Comparison	N=23 Control Self-administered diaphragmatic breathing followed by forced expirations and cough until expectoration succeeded.																		
Outcomes	Symptoms, number of acute exacerbations, number of sick-leaves, need for additional medication (including antibiotics) and by lung function tests).																		
Characteristics	Demographic characteristics: (Mean +/-SD) <table border="1" style="margin-left: 20px;"> <thead> <tr> <th></th> <th>PEP</th> <th>Control</th> </tr> </thead> <tbody> <tr> <td>Age yrs</td> <td>62</td> <td>63</td> </tr> <tr> <td>FEV1 L</td> <td>1.72 (0.73)</td> <td>2.07 (0.57)</td> </tr> <tr> <td>FEV1 % pred</td> <td>62.5 (23.9)</td> <td>77.4 (20.7)</td> </tr> <tr> <td>FVC L</td> <td>2.60 (0.82)</td> <td>2.91 (0.54)</td> </tr> <tr> <td>FEV1/FVC</td> <td>0.65 (0.14)</td> <td>0.71 (0.11)</td> </tr> </tbody> </table> <p>Only four pts, all in the PEP group, had severe pulmonary obstruction (FEV1 <1.0L). No other information given. Concomitant treatment included beta2 agonist, theophylline and corticosteroid. Acute exacerbations were treated with antibiotics & mucolytics. Exclusions – Asthmatics, prophylactic mucolytic drugs, >10mg prednisolone.</p>		PEP	Control	Age yrs	62	63	FEV1 L	1.72 (0.73)	2.07 (0.57)	FEV1 % pred	62.5 (23.9)	77.4 (20.7)	FVC L	2.60 (0.82)	2.91 (0.54)	FEV1/FVC	0.65 (0.14)	0.71 (0.11)
	PEP	Control																	
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FVC L	2.60 (0.82)	2.91 (0.54)																	
FEV1/FVC	0.65 (0.14)	0.71 (0.11)																	
Results	Symptoms (Diary responses) The PEP group reported significantly less cough (p=0.025) and less mucus production (p=0.013) than the control group. Acute exacerbations The PEP group had fewer acute exacerbations compared to the control group (6 vs 28). The number of patients who experienced acute exacerbations was smaller in the PEP group compared to the control group (3 vs 12). In the PEP group, 85% (compared to 48% in the control group) remained free from acute exacerbations (p=0.011). The exacerbation rate defined as the number of acute exacerbations divided by the observation time was calculated for each pt and this value was significantly lower in the PEP group compared to the control group (p<0.0005).																		

	<p>Sick days There was a large difference between the number of day sick, 17 vs 64 (PEP vs control), but 36 of the sick list days were for one patient.</p> <p>Antibiotics The antibiotic rate was significantly lower in the PEP group compared to the control group (p<0.005). The pt with 36 days off sick had antibiotics for 19 days. When this one participant is excluded from the data the PEP group still had significantly less use of antibiotics (p<0.05).</p> <p>Mucolytics The use of acetylcysteine and other mucolytic drugs was significantly lower in the PEP group compared to the control group (p<0.025 and p<0.05). Not clear whether the p values quoted are for the two drug groups or for the intervention & control group. Not told what the difference between the two groups are.</p> <p>Other medical treatment No significant differences between the two groups.</p> <p>FEV1 When data was analysed with only the pts treated for 12 months, there was a significant difference in FEV1 in favour of the PEP group (p=0.039). N.B Differences in baseline characteristics.</p>
SIGN Quality Rating	+
Hierarchy of Evidence Grading	1b
NCC CC ID	1651

Author / Title / Reference / Yr	Van Hengstum, M., Festen, J., Beurskens, C., Hankel, M., Beekman, F., & Corstens, F. 1991, "Effect of positive expiratory pressure mask physiotherapy (PEP) versus forced expiration technique (FET/PD) on regional lung clearance in chronic bronchitis", <i>European Respiratory Journal</i> , vol. 4, no. 6, pp. 651-654. Ref ID: 1660
N=	N=7 (Cross over design). Location=Not specified. Geographic site=Netherlands. Duration=One 20 to 30 minute session of each intervention.
Research Design	RCT
Aim	To assess by using radio aerosol technique the effect of PEP on regional lung clearance in pts with chronic bronchitis, as compared with FET, which included postural drainage (FET / PD).
Operational Definition	Chronic bronchitis defined by MRC criteria.
Population	Mucus hyper secreting stable chronic bronchitics
Intervention	PEP - Constituted positive expiratory pressure mask breathing interspersed with breathing exercises. huffing and if necessary

	coughing. Performed five times resulting in a total duration of about 20 minutes.
Comparison	FET combined with postural drainage (PD) - Consisted of breathing exercises, huffing and if needed coughing. FET was combined with PD. Duration of FET session about 30 minutes.
Control	No physiotherapy. Spontaneous coughing only.
Outcomes	Following inhalation of a radio aerosol, regional lung clearance was estimated by gamma camera imaging.
Characteristics	6 males / 1 female. Mean age 62 yrs. (Range 48 to 73 yrs) FEV1 56 (SD +/-21) % predicted. FVC 75 (SD+/- 29) % predicted. FEV1/VC% 64 (SD +/- 22) % predicted. Mean sputum production 32 (range 16 to 58) g/day.
Results	24 hour retention No significant differences were found between the values for 24-hour retention in the three measurements. PI No significant differences. Lung clearance The mean clearance in all three-lung zones (inner, intermediate and peripheral zones) was largest after FET/PD as compared with PEP and control. Statistical significance (p<0.02) was reached only for clearance in the inner region after FET/PD as compared with both PEP and control.
SIGN Quality Rating	-
Hierarchy of Evidence Grading	1b
NCC CC ID	1660

Author / Title / Reference / Yr	Olsen, L., Midgren, B., Hornblad, Y., & Wollmer, P. 1994, "Chest physiotherapy in chronic obstructive pulmonary disease: Forced expiratory technique combined with either postural drainage or positive expiratory pressure breathing", <i>Respiratory Medicine</i> , vol. 88, no. 6, pp. 435-440. Ref ID: 1656
N=	N=14. Location=Sweden Sites=Outpatient department of lung medicine. Duration=Mucus clearance - 5 sets of scintigraphic images were obtained at 22 minute intervals post inhalation of radio labelled aerosol and physiotherapy. Pt satisfaction assessed on both study days.
Research Design	RCT (Cross over study).
Aim	To measure the short term effects on mucus clearance after forced expiratory technique (FET) combined with either postural drainage (PD) or positive expiratory pressure breathing (PEP) on two different days.

Operational Definition	History of chronic bronchitis (daily cough and expectoration for at least three consecutive months for the last 2 yrs)
Population	N=14 COPD
Intervention	Forced Expiratory Technique (FET) and postural drainage (PD) for 30 minutes
Comparison	Forced Expiratory Technique and positive expiratory pressure (PEP) for 20 minutes
Outcome	Whole lung and on regional lung mucus clearance. Pt satisfaction.
Characteristics	N=6 females / N=8 males / Mean age 57 yrs / None of the participants had a significant bronchodilator reversibility indicating asthma.
Results	Clearances from the whole lung and from central and peripheral regions were much greater after physiotherapy than at rest. Clearance during PD + FET was significantly higher than during PEP & FET in the total lung field ($p < 0.05$) and in the peripheral region ($p < 0.004$). The patients found the two methods equally efficient but most of the patients preferred PEP (N=9) as a treatment, compared to N=1 who preferred PD (N=4 were indifferent).
SIGN Quality Rating	-
Hierarchy of Evidence Grading	1b
NCC CC ID	1656

Author / Title / Reference / Yr	Kurabayashi, H., Machida, I., Tamura, K., Iwai, F., Tamura, J., & Kubota, K. 2000, "Breathing out into water during subtotal immersion: A therapy for chronic pulmonary emphysema", <i>American Journal of Physical Medicine & Rehabilitation</i> , vol. 79, no. 2, pp. 150-153. Ref ID: 1654
N=	N=17 Location=Japan Sites=One hospital Duration=Outcome measurements at "2 months later or the end of the programs"
Research Design	RCT
Aim	To determine the clinical effects of breathing out into water, researchers compared two breathing exercise programs during subtotal immersion, with and without a breathing out into water exercise, in pts with chronic pulmonary emphysema.
Operational Definition	Nil given. Breathing exercises were repeated for 30 minutes/day for 5 days/wk in both programs.
Population	N=17 with stable chronic pulmonary emphysema
Intervention	N=9 Program A: Pool water to should level, diaphragmatic breathing, they breathed in deeply in standing position and breathed out slowly through mouth into water after sinking nose 3-5 cm below water level (eyes not under water).
Comparison	N=8 Program B: During diaphragmatic breathing by head-out water immersion (pts did not sink nose into water but remained standing) and breathed out through mouth into the air, not water.
Outcome	Pulmonary function

Characteristics	11 males and 6 females. Average age 73 yrs. Concomitant medication included bronchodilators and mucolytic drugs. None of the participants had been prescribed prednisolone during the previous 6/12. Baseline disease severity measures not given
Results	FVC Not significant FEV1% Significant increase in pts in program A (p=0.018) but not those in program B Peak flow Significantly increased in pts in program A (p=0.039) but not program B V₂₅ Did not change in either program PaO₂ and PaCO₂ Significantly increased in program A (p=0.010) and PaCO ₂ was significantly decreased in program A (p=0.040). PaO ₂ and PaCO ₂ did not change in program B.
SIGN Quality Rating	-
Hierarchy of Evidence Grading	1b
NCC CC ID	1654

Author / Title / Reference / Yr	Savci, S., Ince, D. I., & Arikan, H. 2000, "A comparison of autogenic drainage and the active cycle of breathing techniques in patients with chronic obstructive pulmonary diseases", <i>Journal of Cardiopulmonary Rehabilitation</i> , vol. 20, no. 1, pp. 37-43. Ref ID: 1658
N=	N= 30 Location=Turkey. Sites=Not specified. Duration=20 session treatment program. Treatments were applied 20 minutes per day for 5/7.
Research Design	RCT
Aim	To determine the effects of a 20-day treatment program of AD and the ACBT on pulmonary function, arterial blood gases and 6MWD in pts with stable COPD.
Operational Definition	ATS criteria. FEV1 of 20 to 60% predicted before beta2 agonists, and a maximum improvement of 15% of predicted values of FEV1 after routine reversibility tests.
Population	N=30 male stable COPD

Intervention	N=? Autogenic drainage (AD)
Comparison	N=? Active cycle of breathing techniques (ACBT)
Outcome	Pulmonary function, arterial blood gases and 6MWD
Characteristics	All pts male. Mean age of AD group 58yrs (48 to 76 years) and the ACBT group was 61 yrs (44 to 72 years).
Results	<p>Limited results available. Most results are mean pre and post treatment values only and hence are not reproduced here. Difference between post treatment and pre-treatment values of each treatment are limited and only presented for the following variables:</p> <p>Peak expiratory flow rate and PaCO₂ Increased significantly more in the AD treatment group than in the ACBT group (p<0.05).</p> <p>SaO₂ Increase significantly in the ACBT group compared to the AD group (p value not given).</p> <p>Other parameters Did not significantly differ between the groups (p>0.05).</p>
SIGN Quality Rating	-
Hierarchy of Evidence Grading	1b
NCC CC ID	ID 1658