FOCUSED QUESTION
In persons with chronic obstructive pulmonary disease (COPD), is a combination of exercise and activity-based breathing training more effective than a combination of exercise and lecture on healthy lifestyle or exercise alone, at improving and maintaining occupational performance, quality of life and exercise tolerance?


CLINICAL BOTTOM LINE:
Persons with chronic obstructive pulmonary disease (COPD) experience dyspnea, weakness, and loss of function, which can reduce quality of life. These individuals also may experience frequent exacerbations and hospitalizations that further reduce function and quality of life. Occupational therapy interventions that may be beneficial to patients with COPD are activities of daily living (ADL) training, energy conservation, exercise, and breathing training. This randomized controlled trial looked at three different components of pulmonary rehabilitation. The components were exercise, education in a lecture format, and education during actual activity. All three groups participated with twice weekly exercise sessions of 1-hour duration. These exercise sessions were individualized using a BORG scale, maintaining perceived exertion between 11 (fairly light) and 13 (somewhat hard). The activities chosen for the activity training were those activities identified by the participants as causing the most dyspnea. Some examples were bed making, gardening, and wood working. The randomly assigned groups were exercise alone (ETA), exercise combined with education in a lecture format (ETLS), and exercise combined with education during activities identified by the patient as causing dyspnea (ETAT).

The results of the study showed that patients who received education while performing dyspnea-causing activities had lower levels of fatigue and dyspnea. This resulted in improved ability to engage in occupation. Another finding of this study was that older clients had the best outcomes using the activity-based training combined with exercise. This was compared with exercise alone and exercise combined with lecture. This study affirmed the use of real life activities during the rehab process, making occupational therapists the ideal professional for this type of training. Based on the outcomes of this study, occupational therapists will be more successful with their pulmonary rehab patients if they provide breathing and other forms of education during real activities in addition to the patient’s exercise program. The authors identified that one limitation of the study was the small sample size, both starting
out and through attrition during 24 weeks of the study. Also, client age became a confounding variable in this study. Older clients experienced more improvements in the ETAT group whereas younger clients in the same group did not experience any greater functional improvements than clients in the other two groups.

RESEARCH OBJECTIVE(S)
To study the short-term and long-term effects of combining activity training or lectures to exercise training on quality of life, functional status, and exercise tolerance.

DESIGN TYPE AND LEVEL OF EVIDENCE:
Level I: Randomized controlled trial with a three group comparison.

Limitations (appropriateness of study design):
Was the study design type appropriate for the knowledge level about this topic? Circle yes or no, and if no, explain

YES/NO
Given that exercise during pulmonary rehabilitation has been found to be effective in previous studies, all three groups received the same exercise training.

SAMPLE SELECTION
How were subjects selected to participate? Please describe.

Sixty-seven participants who were admitted for outpatient pulmonary rehabilitation at the Rusk Institute of Rehabilitation were invited to participate in the study. All were medically stable outpatients with COPD. Forty-three consented to participate and were randomly assigned to the three treatment groups using a biased coin design and probability table. The authors did not state why the other 24 patients chose not to participate.

Inclusion Criteria
• Medically stable
• Literate and coherent in the English language
• Diagnosis of COPD

Exclusion Criteria
• Cognitive deficits as indicated with a score of < 24 on Mini-Mental State Examination
• Dementia
• Blindness
• Unstable angina
• Any other disabling condition that would interfere with participation

SAMPLE CHARACTERISTICS
Total N = 43 randomized into groups
37 commenced treatment
33 were reevaluated at 6 weeks
31 finished 10 weeks of treatment
21 remained until the final evaluation at 24 weeks
% Dropouts

43% of patients who began treatment dropped out by 24 weeks. According to the authors, dropouts were mostly due to COPD-related surgery, illness, injury, finding the intensity of the program too great, and being unreachable or unwilling to be reevaluated.

# (%) Male  11 (33%)*  # (%) Female  22 (66%)*

*number of male/female only indicated at 6 weeks, not at beginning of study

Ethnicity  

98% White, 2% African-American

Disease/diagnosis disability

Chronic obstructive pulmonary disease (COPD)

Check appropriate group size:

<table>
<thead>
<tr>
<th>Group Size</th>
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<tbody>
<tr>
<td>&lt;20/study group</td>
</tr>
<tr>
<td>20–50/study group ✔</td>
</tr>
<tr>
<td>51–100/study group</td>
</tr>
<tr>
<td>101–149/study group</td>
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<td>150–200/study group</td>
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INTERVENTION(S) AND CONTROL GROUPS

Add groups if necessary

Group 1

N = 15  
COPD patients received exercise alone. Exercise was individualized using the Borg scale of perceived exertion, maintaining a perceived exertion between 11 (fairly light) and 13 (somewhat hard). Patients mostly walked on the treadmill for 20–30 minutes, with speed and incline increased as tolerated. Upper body strength training was occasionally done for 25% of the session. Patients used supplemental oxygen as needed. Chest physical therapy also was provided as needed during the exercise sessions. There was no formal breathing training.

Setting  
Outpatient pulmonary rehabilitation program

Who Delivered?  
Physical therapy

Frequency?  
15 sessions, 1 hour each, twice weekly

Duration?  
According to the article, the mean duration was 9.7 weeks.

Group 2:

N = 10  
COPD patients received exercise and education in lecture format. These patients received the same exercise as described in the first group. They also listened to lectures one time per week for 45 minutes each on a variety of topics. These
topics included healthy lifestyles, stress management and relaxation, and nutrition. They received information about normal lung anatomy and physiology, lung pathology, medications, oxygen management, environmental irritants, and infection prevention. Controlled breathing strategies were not taught in the lectures.

<table>
<thead>
<tr>
<th>Setting</th>
<th>Outpatient pulmonary rehabilitation program</th>
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</table>
| Who Delivered?              | • Physical therapist delivered exercise portion.  
                                • Lectures were delivered by two occupational therapists, psychologist, and a nutritionist. |
| Frequency?                  | • Exercise was 15 sessions, 1 hour each, twice weekly  
                                • Lectures were 1 session per week, 45 minutes long |
| Duration?                   | According to the article, the mean duration was 9.7 weeks. |

Group 3:

N = 18 COPD patients received exercise and activity training. These patients received the same exercise as described in the first group. They also participated in six weekly 1-hour sessions of individualized occupational therapy. Participants identified activities that caused dyspnea and then learned and practiced dyspnea-reducing strategies while doing the identified activities. These strategies included breathing retraining while using auditory and visual feedback. Auditory feedback consisted of tapes of paced breath sounds and visual feedback consisted of pulse oximeter displays. Examples of activities chosen by the participants were bed making, gardening, and wood working.

<table>
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</table>
| Who Delivered?              | • Physical therapist delivered exercise.  
                                • Occupational therapist provided activity training. |
| Frequency?                  | • Exercise was 15 sessions, 1 hour each, twice weekly  
                                • Occupational therapy was 1 session per week, 1 hour long for 6 weeks |
| Duration?                   | According to the article, the mean duration was 9.7 weeks. |

INTERVENTION BIASES: *Indicate yes or no and explain, if needed.*

Contamination

Yes/No

Co-intervention

Yes/No  Participants were encouraged to exercise at home unsupervised for at least 20 minutes 2–3 days per week. There was no discussion of a monitoring tool of the home exercise component.

Timing
The mean length of participation was 9.7 weeks; this length of time was significant enough to produce the necessary treatment effect evident by improvement at the 6- and 12-week reassessments. No further significant improvement was reported at the 18- and 24-week follow-ups.

Site
YES/NO All exercise training was completed in the same location for each group.

Use of different therapists to provide intervention
YES/NO Different therapists to provided intervention. The exercise training was completed by multiple physical therapists, which may have caused bias based on the clinician’s interaction and treatment style with the participants.

MEASURES AND OUTCOMES
Complete for each relevant measure when answering the evidence-based question:
Name of measure, what outcome was measured, whether the measure is reliable and valid (as reported in article – yes/no/NR [not reported]), and how frequently the measure was used.

The Chronic Respiratory Disease Questionnaire (CRQ): Health-related quality of life assessment.
Reliability and Validity: Yes
Frequency: Assessment completed at initiation, 6, 12, 18 and 24 weeks.

The Modified Pulmonary Functional Status and Dyspnea Questionnaire (PFSDQ-M):
Measurement of functional status
Reliability and Validity: Yes
Frequency: Assessment completed at initiation, 6, 12, 18 and 24 weeks.

COPD Self-Efficacy Scale (CSES): Functional status
Reliability and Validity: Yes
Frequency: Assessment completed at initiation, 6, 12, 18 and 24 weeks.

6 minute walk test (6MWT): Exercise tolerance
Reliability and Validity: Yes. The authors reported this assessment was reliable and valid
without specific discussion of the details.

Frequency: Twice at baseline to control for practice effects and at the 15th session of exercise training.

Verbal cueing was limited to two standardized prompts: “You are half way done” and “You have 1 minute to go.”

Name of measure, what outcome was measured, whether the measure is reliable and valid (as reported in article – yes/no/NR [not reported]), and how frequently the measure was used.

Measurement Biases

Were the evaluators blind to treatment status? *Circle yes or no, and if no, explain.*

**YES/NO**  
There is not a statement of a blind assessment. The physical therapist administered the 6MWT, and the 1st author administered the other assessments and was not blinded.

Recall or memory bias. *Circle yes or no, and if no, explain.*

**YES/NO**  
6MWT: No, this test was completed with the clinician.

**YES/NO**  
The CRQ, PFSDQ-M, and CSES are all self-reporting questionnaires that could be memory biased because they were administered by the first author during every reassessment.

Others (list and explain):

**NR**

**RESULTS**

List results of outcomes relevant to answering the focused question

Include statistical significance where appropriate (p<0.05)

Include effect size if reported

Older participants who participated in the exercise and activity group had less fatigue and dyspnea with activity, were able to participate more, and had better functional status than those in the exercise and education group (p ≤ 0.04). The ETAT group had significantly less dyspnea with activities (p ≤ 0.003), fatigue with activities (p ≤ 0.003), and change in activity involvement from premorbid levels (p ≤ 0.02), and significantly better total functional status compared to the ETA group at 12 weeks for older participants (p ≤ 0.01).

Quality of life results were again higher for ETAT group compared to the ETLS group (adjusted p = 0.03); length of time in the group did not impact the results. Mean emotional function scores of the ETAT and ETA groups were also significantly better than those of the ETLS group (p = 0.02 and p = 0.03) The CRQ did not reveal any main treatment group effects for dyspnea (p = 0.09), fatigue (p = 0.22), or mastery (p = 0.37). Age was found to be a significant covariate for CRQ total quality of life (p = 0.048) and mastery (p = 0.007) only. No significant differences were found between the treatment groups for self-efficacy (p = 0.53) and walk distance (p = 0.77). The ETAT group had the greatest tolerance for exercise as
compared to the other two and the estimated marginal mean for walking distance was improved by 180 feet at discharge.

Was this study adequately powered (large enough to show a difference)? *Indicate yes or no, explain.*

**YES/NO**
The power was low due to small sample size. The author discussed how the overall significant treatment effect for the CRQ was 0.48. A minimum sample size of 65 would have been required to increase the power to an acceptable level of 0.77.

Were appropriate analytic methods used? *Indicate yes or no, and if no, explain.*

**YES/NO**

Were statistics appropriately reported (in written or table format)? *Indicate yes or no, and if no, explain.*

**YES/NO**

**CONCLUSIONS**
State the authors’ conclusions that are applicable to answering the evidence-based question.

The study concluded that for persons with COPD, a combination of exercise and activity-based breathing training was most effective. The researchers, utilizing a randomized control study of 43 participants with COPD and using 3 sound outcomes measures, were able to report that the ETAT group with older participants gained improved functional status as compared to the ETLS. They also stated the additional benefits gained from the activity training adjunct may result from improved learning and application of dyspnea management strategies and more diversified opportunities for desensitization to dyspnea. Real life activities were found to be the most effective for pulmonary treatment for COPD patients, making occupational therapists the ideal profession to provide this treatment. Further studies are indicated using a larger sample size.

This work is based on the evidence-based literature review completed by Joshua Greene, OTR, Margaret Gulledge, OTR, and Salvador Bondoc, OTD, OTR/L, FAOTA, Faculty Advisor, Quinnipiac University.


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