Improved Quality of Life for Chronic Obstructive Pulmonary Disease Patients Using Specialized Pulmonary Rehabilitation Programs

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Chronic Obstructive Pulmonary Disorder (COPD) is known to be an inflammation of the airways that can be caused by prolonged exposure of harmful toxins that enter the airway such as smoke, air pollutants, or extreme chemicals. Symptoms of the disease include but are not limited to shortness of breath, mild cough, acute production of phlegm, and exhaustion.

Background

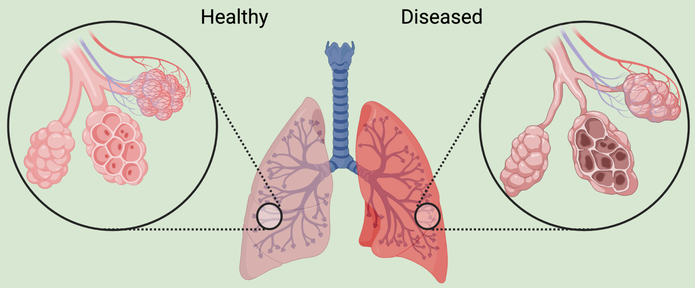


Figure 1. Lung function is compromised in a diseased state. Most commonly, breathing capabilities are diminished, and patients have an inability to complete regular activities. Lung damage is not directly fixed through pulmonary rehabilitation, but symptoms are often targeted for alleviation. Figure created with BioRender.

- COPD is one of the most common lung diseases.
  - With a wide variety of symptoms and causes, patients with COPD have different outcomes with rehabilitation programs.
- Doctor-patient relationships are critical in achieving beneficial care and adjusting treatment when necessary.
- Precision medicine (PM) refers to treatment of patients that is based in biomarker, phenotypic characteristics, or psychosocial factors that differs from patient to patient.

Table 2. Variables and Point Values Used for the Computation of the Body-Mass Index, Degree of Airflow Obstruction and Dyspnea, and Exercise Capacity (BODE) Index.* Table from Celli et al. 2005

Variable	Points on BODE Index			
	0	1	2	3
FEV_1 (% of predicted)†	≥65	50–64	36–49	≤35
Distance walked in 6 min (m)	≥350	250–349	150–249	≤149
MMRC dyspnea scale‡	0–1	2	3	4
Body-mass index§	>21	≤21		

* The cutoff values for the assignment of points are shown for each variable. The total possible values range from 0 to 10. FEV_1 denotes forced expiratory volume in one second.
† The FEV_1 categories are based on stages identified by the American Thoracic Society.
‡ Scores on the modified Medical Research Council (MMRC) dyspnea scale can range from 0 to 4, with a score of 4 indicating that the patient is too breathless to leave the house or becomes breathless when dressing or undressing.
§ The values for body-mass index were 0 or 1 because of the inflection point in the inverse relation between survival and body-mass index at a value of 21.

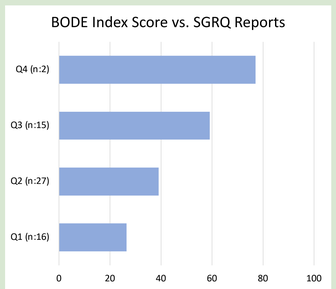


Figure 3. On the left, this is a table to reference for the point system for the BODE index. The BODE index is tailored to be a more accurate predictor of mortality in COPD. On the right, this is a graph to represent the relationship of BODE index scores and the patient's quality of life as told by the St. George's Respiratory Questionnaire (SGRQ) total scores.

Methods

To evaluate PR programs, we conducted a literature review of 33 studies to evaluate patient experience focusing on physical exercise, quality of life, comorbidities, and qualitative dropout responses.

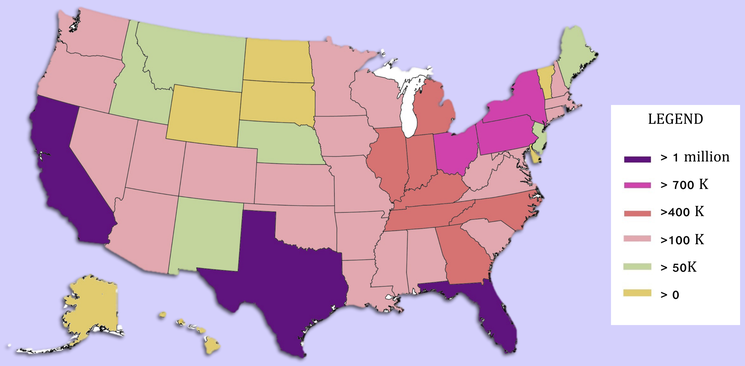
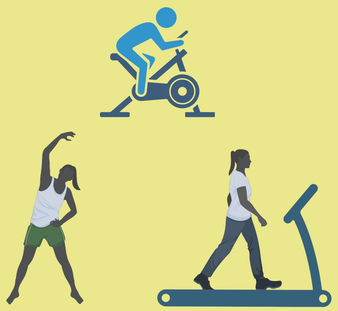


Figure 2. Incidences of COPD around the US as reported in 2020. Image provided by Vemaps ©; data adapted from American Lung Association.

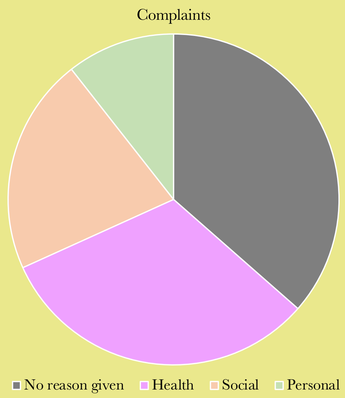
Routine PR Programs

- General rehabilitation that focuses on relieving pulmonary symptoms such as diminished physical capabilities
- Preliminary assessment focuses on body-mass index, forced expiratory volume in one second, six-minute walk test, and diminished breathing
- Physical exercise programs include endurance training with treadmills and standing-bike cycling and strength training by using weights



Delinquencies Found

- Issues with healthcare conveyed that, for some cases, clinicians have not been able to adequately accommodate for patients with comorbidities.
- Precision medicine is not always perfect. Sometimes patients are not able to complete PR based on things outside of a doctor's control.
  - Personal limitations included unable to attend programs due to lack of time, transportation, or childcare.
  - Social barriers were reported to stem from poor past experiences with exercise or anxiety with large groups of people.



Conclusions/Future Research

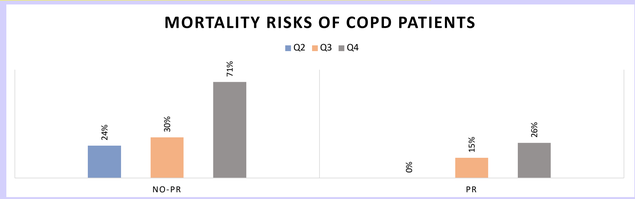


Figure 4. Percentage decreases in mortality based off BODE index scores evaluated 2 years after treatment was recommended. Patients who declined PR still have relatively high mortality risks while patients who participated in PR have lower mortality risks compared to patients who were in the same quartile.

- Patients who can complete exercise training have better results (lowering their BODE index scores and increasing ability to complete daily tasks).
- COPD-specific PR should be updated to maximize patients' health benefits by changing current approaches to the exercise programs as patients provide feedback about their experience.
- Further research should be conducted to show the significance of access to proper healthcare,

References

Scan me!

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