Prognosis in End-Stage COPD

Julie Wilson Childers MD, Robert M Arnold MD, J Randall Curtis MD

Kindful Health

Prognostic variables in COPD patients are not well described, thus decision regarding when to move away from aggressive life-sustaining treatments is challenging. This Fast Fact will review prognostication in patients with advanced COPD.

VARIABLE	POINTS ON BODE INDEX 0	1	2	3
FEV1 (% predicted)	≥65	50-64	36-49	≤35
Distance walked in 6 min (meters)	>350	250-349	150-249	≤149
MMRC dyspnea scale*	0-1	2	3	4
Body-mass index (BMI)	>21	≤21		

*MMRC dyspnea scale range from 0 (none) to 4 (4 dyspnea when dressing or undressing).

Ambulatory COPD Patients The forced expiratory volume in one second (FEV1) has traditionally been used to assess COPD severity. A FEV1 of less than 35% of the predicted value represents severe disease; 25% of these patients will die within two years and 55% by four years. A number of other studies have shown that age, low body mass index (BMI), serum inflammatory biomarkers (such as C-reactive protein, IL-6, and fibrinogen) and low PaO2 were independent predictors that correlated to reduced survival time. The BODE scale, consisting of BMI, exercise capacity, and subjective estimates of dyspnea, has been shown to help predict survival over 1-3 years (2).

Hospitalized COPD Patients Mortality statistics vary for patients admitted with COPD exacerbations depending on age, functional status, co-morbidities, and physiological variables such as hypoxia and hypercarbia. Roughly 10% of patients admitted with a PaCO2 >50 mmHg will die during the index hospitalization, 33% will die within six months, and 43% die within one-year (3). Patients with less severe COPD have lower in-hospital mortality rates (4). COPD patients who require mechanical ventilation have an-hospital mortality of ~25% (5,6). Poor prognostic factors include: co-morbid illnesses, severity of illness (APACHE II score), low serum albumin, and/or low hemoglobin. Previous mechanical ventilation, failed extubation, or intubation for greater than 72 hours all increase mortality (5). In one study, patients ventilated more than 48 hours had a 50% one year survival; functional status and severity of illness were associated with short term mortality while age and co-morbidities were associated with one year mortality (2).

BODE INDEX SCORE	ONE YEAR MORTALITY	TWO YEAR MORTALITY	52 MONTH MORTALITY
0-2	2%	6%	19%
3-4	2%	8%	32%
4-6	2%	14%	40%
7-10	5%	31%	80%

Note: Variables do not appear to help predict prognosis within six months of death.

National Hospice and Palliative Care Organization Criteria NHPCO guidelines for hospice admission in COPD include factors such as cor pulmonale and pO2 <55 mmHg while on oxygen, albumin < 2.5 gm/ dl, weight loss of > 10%, progression of disease, and poor functional status. However, a study showed when using these factors, 50% of the patients were still alive at six months, implying that the NHPCO criteria have a limited role in predicting six month mortality and thus should be used with caution in determining hospice eligibility under the Medicare Hospice Benefit (7).

Summary COPD is a heterogeneous disease without a simple prognostic trajectory. For ambulatory patients, age, degree of dyspnea, weight loss (BMI), functional status, and FEV1 are relevant prognostic factors for predicting 1-3 year survival. For hospitalized patients, the same factors are relevant. In addition, the need for prolonged or recurrent mechanical ventilation is predictive of a shorter prognosis.

REFERENCES

1. **Celli BR, Locantore N, et al.** Inflammatory biomarkers improve clinical prediction of mortality in chronic obstructive pulmonary disease. American Journal of Respiratory and Critical Care Medicine. 2012; 185:1065-72.
2. **Celli BR, Cote CG, Marin JM, et al.** The body-mass index, airflow obstruction, dyspnea, and exercise capacity index in chronic obstructive pulmonary disease. N Eng J Med. 2004; 350(10):1005-12.
3. **Connors AF Jr, Dawson NV, Thomas C, et al.** Outcomes following acute exacerbation of severe chronic obstructive lung disease. The SUPPORT investigators (Study to Understand Prognoses and Preferences for Outcomes and Risks of Treatments). Am J Respir Crit Care Med. 1996; 154:959-967.
4. **Patil SP, Kirshnan JA, et al.** In-hospital mortality following acute exacerbations of chronic obstructive pulmonary disease. Arch Intern Med. 2003; 163:1180-1186.
5. **Nevins ML, Epstein SK.** Predictors of outcome for patients with COPD requiring invasive mechanical ventilation. Chest. 2001; 119:1840-9.
6. **Seneff MG, Wagner DP, Wagner RP, et al.** Hospital and 1-year survival of patients admitted to intensive care units with acute exacerbation of chronic obstructive pulmonary disease. JAMA. 1995; 274:1852-57.
7. **Fox E, Landrum-McNiff K, Zhong Z, Dawson NV, Wu AW, Lynn J.** Evaluation of prognostic criteria for determining hospice eligibility in patients with advanced lung, heart, or liver disease. JAMA. 1999; 282(17):1638-45.

Version History This Fast Fact was originally edited by David E Weissman MD and published in August 2005. Version re-copy-edited in April 2009; revised again July 2015 by Sean Marks MD with reference #1 added and incorporated into the text.