Original Article

The Trajectory of Dyspnea in Hospitalized Patients

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Abstract

Context. The trajectory of dyspnea for patients hospitalized with acute cardiopulmonary disease, who are not terminally ill, is poorly characterized.

Objectives. To investigate the natural history of dyspnea during hospitalization and examine the role that admission diagnosis, and patient factors play in altering symptom resolution.

Methods. Prospective cohort study of patients hospitalized for an acute cardiopulmonary condition at a large tertiary care center. Dyspnea levels and change in dyspnea score were the main outcomes of interest and were assessed at admission, 24 and 48 hours, and at discharge using the verbal 0–10 numeric scale.

Results. Among 295 patients enrolled, the median age was 68 years, and the most common admitting diagnoses were heart failure (32%), chronic obstructive pulmonary disease (COPD) (39%), and pneumonia (13%). The median dyspnea score at admission was 9 (interquartile range [IQR] 7–10); decreased to 4 (IQR 2–7) within the first 24 hours; and subsequently plateaued at 48 hours. At discharge, the median score had decreased to 2.75 (IQR 1–4). Compared to patients with heart failure, patients with COPD had higher median dyspnea score at baseline and admission and experienced a slower resolution of dyspnea symptoms. After adjusting for patient characteristics, the change in dyspnea score from admission to discharge was not significantly different between patients hospitalized with congestive heart failure, COPD, or pneumonia.

Conclusion. Most patients admitted with acute cardiopulmonary conditions have severe dyspnea on presentation, and their symptoms improve rapidly after admission. The trajectory of dyspnea is associated with the underlying disease process. These findings may help set expectations for the resolution of dyspnea symptoms in hospitalized patients with acute cardiopulmonary diseases. J Pain Symptom Manage 2016;51:682–689

Key Words

Dyspnea, chronic obstructive pulmonary disease, heart failure, pneumonia, hospitalization

Introduction

Dyspnea, often defined as the inability to breathe comfortably,[1] is a common complaint of patients with cardiopulmonary disease. A recent study found that 9% of community-dwelling adults report experiencing dyspnea.[2] Significant dyspnea is often the reason a person seeks medical attention, and 3.5% of all emergency department (ED) visits are for evaluation and treatment of dyspnea.[3]

The importance of dyspnea evaluation is addressed in the 2012 American Thoracic Society[4] and the 2010 American College of Chest Physicians[5] consensus statements, which recommend that patients with cardiopulmonary diseases should be asked and evaluated for the

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intensity of their breathlessness, and the patient-reported rating should be documented in the medical record to guide management.[4] This quantitation of dyspnea allows clinical interventions to be monitored for effectiveness, while increasing the patient centeredness of care. Dyspnea resolution has been emphasized over other clinical measures by the U.S. Food and Drug Administration as a key endpoint in efficacy trials of acute heart failure therapies.[6] Multiple scoring systems have been developed to quantify dyspnea severity[7,8] and track treatment response.[9] These dyspnea rating scores have additionally been correlated to physiologic measurements, such as spirometry.[10]

However, although the appropriate management of dyspnea symptoms is receiving increased attention, the natural history of dyspnea for patients admitted to the hospital is still poorly characterized. Studies that have addressed dyspnea within hospitalized patients have investigated specific patient populations with widely varying dyspnea rates and have not reported on the resolution of dyspnea symptoms.[11,12] We, therefore, aimed to describe the trajectory of dyspnea throughout the inpatient hospitalization for general medical patients with a broad range of acute cardiopulmonary diagnoses. Additionally, we sought to describe the association between patient factors, including admission diagnosis, body mass index (BMI), and comorbidities, with dyspnea severity and resolution.

Methods

Design, Setting, and Subjects

This was a prospective cohort study that enrolled consecutive patients admitted to Baystate Medical Center, a 714-bed teaching hospital in Western Massachusetts, between June 2012 and June 2013. Patients aged 18 years and older were included if they spoke English and had an admission diagnosis consistent with congestive heart failure (CHF), acute exacerbation of chronic obstructive pulmonary disease (COPD), asthma, pneumonia, pulmonary embolism, lung cancer, or a generic diagnosis of shortness of breath. Patients who were unable to give informed consent or assess their dyspnea because of cognitive impairment, and patients admitted to the intensive care unit were excluded.

The study was approved by the Baystate Health institutional review board, Springfield, MA, with a waiver for writer informed consent (project approval number 322731-16).

Assessment of Dyspnea

All patients were interviewed to assess their severity of dyspnea using the verbal numeric scale (VNS),[13] a 0−10 scale that has been validated for the measurement of breathlessness in the acute care setting.[14,15] Patients were asked, "On a scale from 0 to 10, how bad is your shortness of breath, with zero being no shortness of breath and 10 the worst shortness of breath you could ever imagine?" A trained research assistant asked the patients to rate dyspnea severity at admission, at 24 hours, 48 hours, and on the day of discharge. Usual or baseline dyspnea levels were assessed by asking "Using the same 0 to 10 scale, how would you rate your shortness of breath on a usual day before you became sick and came into the hospital?" At each assessment, the patients were not reminded of their prior score. The research assistant did all the evaluations, which were performed either in the general medical ward or in the ED. The research assistant enrolled patients during the weekdays, from 8 AM to 5 PM

Patient Information

In addition to demographic information such as age, gender, and race, we collected the following information from a claims-based registry: number of admissions in the prior year, source of admission (e.g., ED or nursing home), discharge disposition, and length of stay. Comorbidities were classified using the Agency for Healthcare Research and Quality Healthcare Cost and Utilization Project Comorbidity Software, version 3.7 (U.S. Agency for Healthcare Research and Quality).[16] We also calculated a single numeric comorbidity score using the method described by Gagne, et al.[17] and grouped the score in tertiles, for analysis. Manual review of medical records was used to ascertain clinical data relevant to the study, including smoking history, chronic steroid use, BMI, respiratory rate (RR), admission oxygen saturation index, the partial pressure of carbon dioxide and oxygen in arterial blood gas, N-terminal-pro-brain natriuretic peptide, and transfer to an intensive care unit.

Statistical Analysis

Descriptive statistics for the full cohort and by diagnosis group are presented as frequencies and proportions for categorical variables, and medians and interquartile ranges (IQRs) for continuous variables. Associations between patient characteristics and diagnosis groups were computed via Fisher exact test and chi-square test for categorical variables and by Kruskal-Wallis test for continuous variables.

Change in VNS dyspnea score, which was the main measure of interest, was defined as the difference between the scores at admission and at 24 and 48 hours, and between admission and discharge and, finally, between discharge and baseline. Kruskal-Wallis test was used to assess differences in dyspnea levels and changes across diagnosis groups and BMI categories. We also developed a model for