Prospective Use of Descriptors of Dyspnea to Diagnose Common Respiratory Diseases

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BACKGROUND: Although patients may find it difficult to describe their breathing discomfort, most are able to select statements among a list to describe their experience. The primary objective of this study was to examine sensitivity and specificity of descriptors of breathing discomfort prospectively in patients with common respiratory conditions as well as those patients who had refractory dyspnea.

METHODS: Outpatients answered "Yes" or "No" for each of 15 statements describing breathing discomfort, next selected the best three that most closely applied, and then completed the Hospital Anxiety Depression Scale-Anxiety subscale. Sensitivity, specificity, and predictive values were calculated for the descriptors by diagnosis.

RESULTS: "Work/effort" descriptors were selected as the best three by patients with COPD (n = 68), respiratory muscle weakness (n = 11), and refractory dyspnea (n = 17). Along with "work/effort" descriptors, "My chest feels tight" was among the best three in asthma (n = 22), with 38% sensitivity and 88% specificity. Along with "work/effort" descriptors, "My breathing is shallow" was among the best three in interstitial lung disease (n = 8), with 33% sensitivity and 84% specificity. Affective descriptors "frightening" (61% vs 31%, P = .002) and "awful" (66% vs 37%, P = .004) were reported more frequently in those with high anxiety scores compared with low anxiety scores.

CONCLUSIONS: Although no descriptor achieved satisfactory sensitivity and specificity for identifying a particular condition, chest "tightness" was unique for asthma, whereas "shallow breathing" was unique for interstitial lung disease. Affective descriptors were associated with high anxiety scores. CHEST 2015; 148(4):895-902

Many individuals find it difficult to describe how their breathing discomfort feels. However, when asked to select among a list of descriptors, patients with various cardiorespiratory conditions are able to select statements that describe their experience of dyspnea.[1-3] In 2012, the American Thoracic Society summarized the more reliably characterized qualities of dyspnea as "work/effort," "tightness," and "air hunger/unsatisfied inspiration."[4] Although this information has expanded our understanding of breathlessness, prospective testing has not been performed to examine whether certain descriptors of breathing discomfort are useful in clinical practice to diagnose common respiratory conditions. This consideration is analogous to a physician or nurse asking a patient to describe characteristics of chest pain to distinguish if the cause is due to coronary artery disease, pleural disease, gastroesophageal reflux, anxiety, or another cause.

There were several objectives of this study. First, we sought to determine whether descriptors of dyspnea based on patient recall were similar to descriptors selected immediately after experiencing "moderate" breathing discomfort with walking. Second, we calculated the sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) of descriptors of dyspnea to diagnose four common respiratory diseases—asthma, COPD, interstitial lung disease (ILD),

and respiratory muscle weakness—in patients who sought medical attention for breathing discomfort. As descriptors of dyspnea have not been reported in patients who report breathing discomfort at rest or with minimal activity that is distressful,[5] a third objective was to examine test characteristics of descriptors in those with refractory dyspnea. Finally, as anxiety is a common comorbidity in those with COPD, we sought to investigate the association of descriptors of dyspnea with anxiety.

We had several hypotheses based on findings in previous studies. We proposed that (1) descriptors related to "work/effort" would be prominent among patients regardless of the specific respiratory condition (ie, moderate sensitivity), because respiratory muscles play an important role in the experience of breathing discomfort in all cardiorespiratory diseases[1,2]; (2) "chest tightness" would be unique and specific for those with a diagnosis of asthma[1,6,7]; (3) "rapid" and "shallow" descriptors of breathing would be unique and specific for those with a diagnosis of ILD[1]; and (4) affective descriptors (such as frightening, heavy, awful, and constricted) would be selected more frequently in those patients who had high anxiety scores. Results of PPV and NPV for dyspnea descriptors were considered exploratory, as these characteristics depend on the disease prevalence within the patient population.

Materials and Methods

Subjects

Individuals were recruited from the outpatient pulmonary clinic at our institution from August 2013 through May 2014. Inclusion criteria were age ≥ 18 years, a chief complaint of breathing discomfort for at least 1 month, ability to read English, and willingness to answer questions about their breathing. Exclusion criteria were an unstable condition at the time of evaluation and cognitive impairment.

Test characteristics of the descriptor statements were calculated only for patients with one of four clearly defined diagnoses. COPD was defined by criteria established by the GOLD (Global Initiative for Chronic Obstructive Lung Disease) including FEV_1/FVC ratio $< 70\%$.[8] Asthma was defined by criteria of the American Thoracic Society[9] along with a FEV_1/FVC ratio less than the lower limit of normal or a positive methacholine challenge test. All patients with ILD had diffuse bilateral interstitial infiltrates on a computerized scan of the chest.[10] Patients with respiratory muscle weakness had inspiratory and expiratory mouth pressures less than the lower limit of normal.[11]

Study Design

The study was survey research with a single visit. All patients read a one-page description of the study purpose and procedures and then provided verbal consent if willing to participate. The study protocol was approved by the Committee for the Protection of Human Subjects at Dartmouth College (#24148).

Procedures

All study procedures occurred after patients performed pulmonary function tests and completed an outpatient consultation or follow-up

visit with an attending pulmonary physician. Data were collected by study investigators and took approximately 10 min for each patient.

Patients completed the following items in order using 16 different sequences: modified Medical Research Council scale (higher score indicates more breathlessness),[12] self-administered computerized baseline dyspnea index (higher score indicates less breathlessness),[13] Hospital Anxiety Depression Scale-Anxiety (HADS-A) subscale,[14] and 15 descriptors of breathing discomfort. The 15-item descriptor questionnaire was modified from a previous version used in a study of 218 patients.[1] Two statements—"I feel that I am smothering" and "I feel that I am suffocating"—were deleted because they were not selected by any patient groups.[1] The statement "I feel that I am breathing more" was also deleted because it was selected previously by only those diagnosed with deconditioning.[1] Three affective descriptors—"My breathing is frightening," "My breathing is awful," and "My breathing is annoying"—were added, as these statements were the three most frequently volunteered descriptors by 94 patients with COPD in a study by Williams and colleagues.[3]

The patient circled "Yes" or "No" for each descriptor statement based on recall. Then, the patient was asked to select the "best three" that most closely applied to breathing discomfort. Next, each patient was asked, "Do you have breathing discomfort at rest or with minimal activity that is distressful?" If the patient answered "Yes," he/she was considered to have refractory dyspnea,[5] and no further testing was performed. If the answer was "No," then the patient walked in the hallway at self-determined pace to provoke "moderate" breathing discomfort, which corresponds to "3" on the 0 to 10 category-ratio (CR-10) scale.[15]