

Original Article

Practical Dyspnea Assessment: Relationship Between the 0–10 Numerical Rating Scale and the Four-Level Categorical Verbal Descriptor Scale of Dyspnea Intensity

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Abstract

Context. Measurement of dyspnea is important for clinical care and research.

Objectives. To characterize the relationship between the 0–10 Numerical Rating Scale (NRS) and four-level categorical Verbal Descriptor Scale (VDS) for dyspnea assessment.

Methods. This was a substudy of a double-blind randomized controlled trial comparing palliative oxygen to room air for relief of refractory breathlessness in patients with life-limiting illness. Dyspnea was assessed with both a 0–10 NRS and a four-level categorical VDS over the one-week trial. NRS and VDS responses were analyzed in cross section and longitudinally. Relationships between NRS and VDS responses were portrayed using descriptive statistics and visual representations.

Results. Two hundred twenty-six participants contributed responses. At baseline, mild and moderate levels of breathlessness were reported by 41.9% and 44.6% of participants, respectively. NRS scores demonstrated increasing mean and median levels for increasing VDS intensity, from a mean (SD) of 0.6 (± 1.04) for VDS none category to 8.2 (1.4) for VDS severe category. The Spearman correlation coefficient was strong at 0.78 ($P < 0.0001$). Based on the distribution of NRS scores within VDS categories, we calculated test characteristics of two different cutpoint models. Both models yielded 75% correct translations from NRS to VDS; however, Model A was more sensitive for moderate or greater dyspnea, with fewer misses downcoded.

Conclusion. There is strong correlation between VDS and NRS measures for dyspnea. Proposed practical cutpoints for the relationship between the dyspnea VDS and NRS are 0 for none, 1–4 for mild, 5–8 for moderate, and 9–10 for severe. *J Pain Symptom Manage* 2015;50:480–487. © 2015 American Academy of Hospice and Palliative Medicine. Published by Elsevier Inc. All rights reserved.

Key Words

Dyspnea, Numerical Rating Scale, Verbal Descriptor Scale

Introduction

Dyspnea has been defined as “a subjective experience of breathing discomfort that consists of qualitatively distinct sensations varying in intensity. The

experience derives from interactions among multiple physiological, psychological, social, and environmental factors.”¹ A common experience among people with life-limiting illness, dyspnea prevalence

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has been reported to be as high as 65%, 70%, and 90% in advanced-stage patients with heart failure, lung cancer, and chronic obstructive pulmonary disease, respectively.² Dyspnea is often intractable in advanced disease, frequently escalating in intensity as death approaches,^{3–6} eroding quality of life, psychological well-being, and social functioning.⁷

Dyspnea assessment has been an active area of research for many decades. The complex etiology of dyspnea, both pathophysiological and psychosocial, has proven challenging in developing tools that capture its multiple dimensions. Several recent reviews have examined existing validated measurement tools, highlighting the lack of consensus regarding how to best capture the complicated experience of dyspnea in both clinical and research settings.^{8,9} The spectrum of measures includes single-item ordinal scales, functional assessment scales, global symptom inventories with dyspnea components, and multidimensional dyspnea scales.

The choice of scale depends on purpose, setting, and population. When precision and responsiveness to change are needed, complex multi-item scales may be preferable.¹⁰ However, there are a range of scenarios where single-item dyspnea assessment scales are more appropriate, such as when part of routine clinical care, embedded in a larger group of patient-reported outcomes, or completed repeatedly at short intervals. Among single-item patient-reported scales, the Visual Analogue Scale,¹¹ Numerical Rating Scale (NRS, e.g., 0 = no breathlessness to 10 = worst breathlessness possible),^{12,13} and the modified Borg scale^{14,15} have all been validated, but none have been preferentially adopted.

The proliferation of assessment tools without standardized adoption of any single tool highlights the need for a simple breathlessness scale that can be reliably and practically used in the clinic, efficiently translating evidence between clinical care and clinical trials. Such a tool should be easily understood across diseases and settings, including advanced life-limiting illness, and by patients and their families. To achieve this, it must focus on the subjective sensation of dyspnea and parallel other scales commonly used (e.g., pain assessment).

Wilcock et al.¹³ advocated that the NRS is more practical than the Visual Analogue Scale for repeated measures in cancer patients. However, ordered categorical scales (e.g., none, mild, moderate, or severe) may be even more practical, would more clearly communicate what is meant clinically, and are less abstract for patients, especially if there is any cognitive impairment. For example, an ordered categorical scale is frequently used for pain assessment, and its relationship to the 0–10 NRS is well characterized (Fig. 1), although minor differences in cutpoints exist,

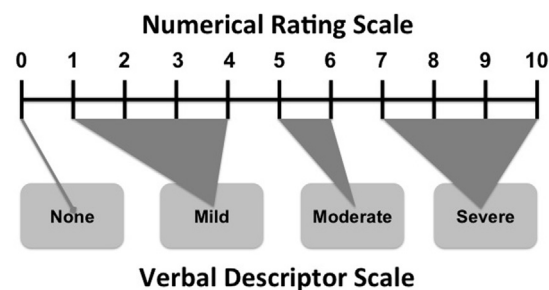


Fig. 1. Practical relationship between Numerical Rating Scale and Verbal Descriptor Scale for pain (based on results from Refs. ^{15,16}).

depending on population and methods.^{16–18} The cut-point between mild/moderate is often used as a lower threshold limit for eligibility in symptom controlled trials.^{19,20}

The aim of this article, therefore, was to determine the relationship between an ordered categorical Verbal Descriptor Scale (VDS) of dyspnea and the dyspnea NRS, in a similar way that these two scales are related for pain assessment.

Methods

This was an a priori planned substudy intentionally embedded within an international, multicenter, double-blind, randomized controlled trial assessing the effect of palliative oxygen vs. room air in relief of refractory dyspnea.²¹ The parent study protocol was approved by the Duke University Health System Institutional Review Board, all nine local research and ethics committees or institutional review boards of all participating sites, and was registered with [ClinicalTrials.gov](https://clinicaltrials.gov) (NCT00327873) and International Standard Randomised Controlled Trial Number (ISRCTN) (ISRCTN67448752).

Participants

In the parent study, patients ($N = 239$) were recruited from pulmonary, palliative care, oncology, and primary care services at five sites in Australia, two in the U.S., and two in the U.K. Participants were consenting adults with refractory dyspnea, partial pressure of oxygen in arterial blood (PaO_2) >55 mmHg, and life-limiting illness where the underlying cause had been maximally treated. Participants had dyspnea at rest or with minimal exertion, corresponding to a Medical Research Council categorical dyspnea score of ≥ 3 ;²² however, patient data were pooled for this project, and there was no analysis according to the intervention used for the parent study. Additional eligibility criteria were that the

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