Should we measure dyspnoea in everyone?

Robert B. Banzett[1,2] and Carl R. O'Donnell[1,2]

Affiliations: [1]Dept of Medicine, Harvard Medical School, Boston, MA, USA. [2]Division of Pulmonary, Critical Care, and Sleep Medicine, Beth Israel Deaconess Medical Center, Boston, MA, USA.

Correspondence: Robert B. Banzett, Division of Pulmonary, Critical Care, and Sleep Medicine, Beth Israel Deaconess Medical Center, 330 Brookline Ave, Boston, MA 02215, USA. E-mail: rbanzett@bidmc.harvard.edu

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Dyspnoea is easy to measure, prevalent and predicts mortality/morbidity risk; we urge assessment for all patients http://ow.ly/vE9Hh

Dyspnoea is defined as "breathing discomfort" [1]. The paper by Grønseth *et al.* [2] in this issue of *European Respiratory Journal* (*ERJ*) reports the prevalence of dyspnoea in 15 countries throughout the world. There are few studies of dyspnoea in the general population available, so this added information is welcome. The overall prevalence of dyspnoea in their study population was 27%, which is not far out of line with several other studies dating from 1964 to the present [3–5]. Some studies, based on review of medical records, have reported much lower prevalence [6]. However, patients may neglect to report dyspnoea to their clinician because they think it does not reach a sufficient level of importance, or clinicians may fail to record what their patients say. Requiring patients to scale their symptoms can result in more uniform reporting, because the patient does not have to decide how much is reportable, it takes very little time and it facilitates uniform documentation. Busy clinicians may ask "is dyspnoea worth documenting?" One powerful argument for routine assessment is the need to reduce suffering, as with pain. A second argument is the emerging predictive value of dyspnoea in forecasting medical needs.

In addition to being prevalent, "dyspnoea" is a powerfully aversive sensation [7] and patients deserve adequate management of this symptom, as passionately argued by Currow *et al.* [8]. Effective interventions exist and should be used [9–11]; assessing dyspnoea is the first step in managing it. Dyspnoea is frequently overlooked despite its prevalence and the severity of distress it causes [12]. For example, despite having had dyspnoea for months a majority of advanced cancer patients had not received any treatment for it [13]. Historically, funding for dyspnoea research is a small fraction of the funding for pain research, and the field is, not surprisingly, behind [14]. Yet in recent years, real progress has been made in understanding dyspnoea, for examples see the report of a recent experts meeting in this issue of the *ERJ* [15]. A great deal remains to be learned, but we now have a much better understanding of the neurophysiology underlying dyspnoea, including several studies of brain activity [16].

Dyspnoea is often dismissed as merely "subjective" in contrast to the increasingly relied upon high-tech measurements that are assumed to yield more valuable "objective" data. We know there is a wide variation among patients in the degree of discomfort reported for apparently similar objective pathophysiological impairment. Although large studies have shown a statistically significant relationship between dyspnoea and airway obstruction (forced expiratory volume in 1 s (FEV_1)), a scatter plot of the data reveals a huge variance among patients; there are many patients with severe airways obstruction who report no dyspnoea and many others who report severe dyspnoea without correspondingly severe pathophysiology [17]. Indeed, Grønseth *et al.* [2] found that a model incorporating about 20 demographic and clinical variables,

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including lung function measurements, explained only 13% of the individual variation in dyspnoea. Other studies have reported weak correlation of dyspnoea with objective measures such as FEV_1 in chronic obstructive pulmonary disease (COPD) [18] and haemodynamic measures in heart failure [19]. Some of the variation in the dyspnoea–pathophysiology relationship reflects differences in how individuals experience discomfort and some reflects differences in how individuals choose to report the discomfort they experience. However, one must also consider the possibility that an important part of the variation in the relationship between dyspnoea and pathophysiology reflects the inability of our "objective" measures to accurately assess the most important features of pathophysiology. The body has been equipped by evolution with thousands of enteroceptors to detect problems in the crucial systems that support the gas exchange essential to life. When these enteroceptors detect malfunctioning gas transport systems, the message reaches consciousness as dyspnoea. Perhaps, despite the degradation of information in the pathway from enteroceptors through conscious perception to patient report, the information from enteroceptors is so rich that even the degraded information is as valuable as the relatively sparse information available from "objective" clinical tests.

Some interesting outcome studies suggest that patient-reported dyspnoea is indeed valuable information. In COPD patients, dyspnoea severity was a much stronger predictor of 5-year mortality than FEV_1 (fig. 1) [20]; dyspnoea predicted cardiac death better than angina in patients with suspected cardiac disease [21]; dyspnoea was a stronger predictor of mortality than gastrointestinal symptoms in oesophageal and gastric cancer patients [22, 23]; and dyspnoea was a strong predictor of all-cause mortality in more general populations [5, 24, 25]. A growing body of evidence suggests that routine measurement and documentation of dyspnoea would have a clinical value disproportionate to the minimal effort needed to obtain the data. Our group has shown that routine nursing measurement of dyspnoea in hospitalised patients is feasible, and that it may provide useful risk prediction [26–28].

What is the best way to measure dyspnoea? The only clear answer is that using some form of quantitative scale is more useful than the yes/no approach. GRØNSETH *et al.* [2] utilised a form of the ubiquitous Medical Research Council (MRC) breathlessness scale ("Breathlessness" is most commonly used in this context in British English; "Shortness of Breath" is more common in the USA; and the word "Dyspn(o)ea" is not understood by most patients). The MRC scale was devised more than half a century ago to assess lung disease in coalminers, but has been widely used in many contexts [29]. The MRC scale assesses dyspnoea by asking which activities, ranging from vigorous exercise to minimal activities of daily living, are limited by dyspnoea. The MRC scale has shown good utility in many studies. A major drawback of the MRC scale in some populations is the lack of a scale point for patients who experience dyspnoea at rest, but it is easy to extend the scale to ask about dyspnoea at rest. Several lengthier scales are also available [30, 31]. However, scales such as the MRC are indirect; they do not actually ask the patient how much dyspnoea they experience. There are various scales used to assess dyspnoea directly, including single-dimension scales of respiratory discomfort, and multidimensional scales that assess discomfort, modality of sensation and emotional response [32–34]. The instrument used should suit the situation, for instance brevity may be

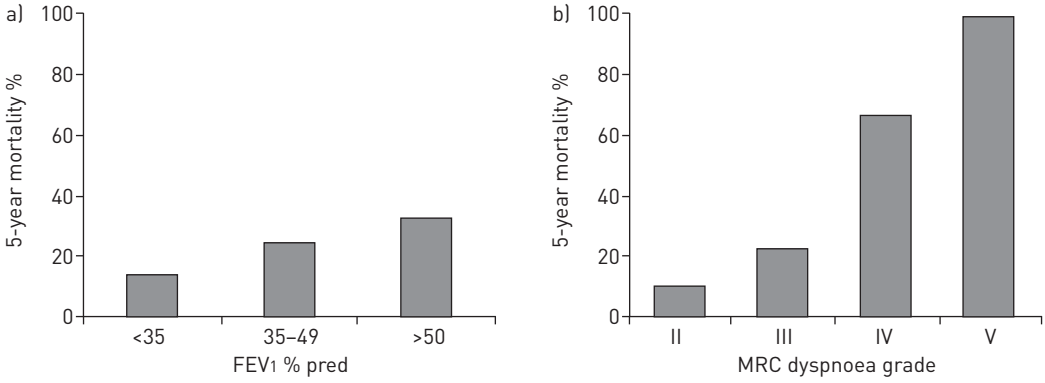

FIGURE 1 a) 5-year mortality rates of patients classified by pulmonary function test according to the American Thoracic Society guidelines. Stage I: forced expiratory volume in 1 s (FEV_1) >50% predicted; Stage II: FEV_1 35–49% pred; Stage III: FEV_1 <35% pred. b) 5-year mortality of patients classified by dyspnoea grade as measured using the Medical Research Council (MRC) breathlessness scale. Grade II: short of breath when hurrying on the level or walking up a slight hill; Grade III: have to walk slower than most people on the level; Grade IV: have to stop for breath after walking about 100 yards (or after a few minutes) on the level; Grade V: too breathless to leave the house, or breathless after undressing. Data from [20].

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more important than completeness for routine clinical use, and different scales may be appropriate for outpatients *versus* inpatients. But even a simple measurement is better than no measurement.

GRØNSETH *et al.* [2] have used mutually standardised measures to extend the observation of dyspnoea prevalence and variance across several cultures and language groups. Their study found important differences in dyspnoea reports among the 15 countries sampled and between males and females across countries. We don't know if these differences really reflect variation in pathophysiology, which might be measured by hard outcomes such as morbidity and mortality, or whether they reflect differences in reporting rooted in sex, culture, language, *etc.* Such questions can be addressed, both in reductionist studies using highly controlled laboratory models of dyspnoea and in prospective population studies looking at hard outcomes.

Although dyspnoea measures have been shown to be useful predictors at a population level (potentially enabling better management of healthcare resources), better understanding of the variation in reporting among individuals and among groups of individuals is needed to refine the use of dyspnoea assessment at the individual prognostic level. Routine measurement in primary care and during hospitalisation may help overcome uncertainty introduced by interindividual variation, an individual's dyspnoea history is, therefore, likely to be more helpful than a snapshot in time. Despite the many unanswered questions about dyspnoea, we already know that simple measures in individual patients can be useful in tracking disease progress or treatment efficacy, can usefully supplement objective measures in diagnosis and prognosis, and are essential in targeting individual symptom management.

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