Presence and treatment of air hunger in severely ill patients

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Summary
Air hunger at end-of-life poses challenges to providers who attempt to comfort while not diminishing mental capacities.
We examined the presence, methods of assessment, and treatment of air hunger. This observational study prospectively screened 198 consecutive medicine admissions for increased risk of near-term death. These patients in turn were screened for dyspnea. Patients screening positive were assessed on admission and the next day with the Visual Analog Scale (VAS), modified Borg Scale, and the American Thoracic Society (ATS) Shortness of Breath Scale. Additionally, resident physician opinions of patient dyspnea level were assessed using the same tools. Treatments focused on alleviating air hunger were recorded. Thirty-nine percent of patients were at risk for near-term death and of these, 53% (95% CI: 41–65%) reported air hunger. All dyspnea scales improved to a statistically and clinically significant degree (Borg $p = 0.007$, VAS $p < 0.0005$, ATS $p = 0.008$). There was statistically significant agreement between Borg–VAS and between Borg–ATS with a trend toward significance with ATS–VAS. Physician assessment of dyspnea showed poor agreement with patients. A median of three treatments were received by patients but dyspnea improvement did not correlate with the type, number, or specific combination of therapies.
Dyspnea is common near end-of-life. Borg or VAS scales appear useful in assessing terminal dyspnea and can be employed in assessing terminal air hunger. No individual treatment or combination of treatments significantly improved patients’ dyspnea. However, air hunger significantly improved with hospitalization.

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Introduction

Treating patients with air hunger at end-of-life, dyspnea associated with the process of active dying, poses a special challenge to providers who attempt to comfort without hastening death or clouding the patient’s sensorium. In 2005, the American College of Chest Physicians released a position statement regarding palliative and end-of-life care for patients with cardiopulmonary diseases. Although this position statement serves as a framework for the management of dyspnea, providers still struggle with how best to assess and treat terminal dyspnea. One reason may be the complex pathophysiology of dyspnea for which multiple treatments exist.

Choosing the right objective tools to assess air hunger can be challenging as different tools can be more useful depending on the clinical situation of the patient. Better knowledge of the types of objective measurements available may help providers care for their dyspneic patients. Mancini and Body separate different assessment tools into three categories: antecedent tools (physiologic or emotional stressors that lead to the development of symptoms), mediator tools (characteristics of individual or their environment and how it affects response), and finally reaction tools (outcomes that result once the stimulus has been reached). Examples of antecedent tools are the British Medical Research Council Scale (MRC), the American Thoracic Society (ATS) questionnaire, and the Dyspnea Interview Schedule. Mediator tools include the ATS, Chronic Respiratory Questionnaire (CRQ), the Dyspnea Interview Schedule, the Pulmonary Functional Status Scale (PFSS), and the Therapy Impact Questionnaire (TIQ). The reaction tools include the Visual Analog Scale (VAS), TIQ, modified Borg Scale, the Dyspnea Interview Schedule, and the CRQ.

Recently, two systematic reviews have been published reviewing measurement scales to assess terminal air hunger. Both concluded that while there is no single scale that can adequately assess terminal dyspnea, some tools appear more useful in the palliative setting. Dorman et al. suggest that the Numeric Rating Scale (NRS), modified Borg, Chronic Respiratory Questionnaire Dyspnea subscale (CRQ-D), and the Japanese Cancer Dyspnea scale (CDS) were best suited in the palliative setting. Bausewein et al. recommended combining a one-dimensional scale such as the VAS with a disease-specific scale. Other options included use of a multidimensional scale in conjunction with qualitative assessment of psychosocial aspects of breathlessness. As management of chronic illnesses becomes more sophisticated and the prevalence of terminal dyspnea increases, the ability to diagnose and treat air hunger will become increasingly important as we seek to relieve suffering.

Air hunger is commonly associated with end-stage cancer. The incidence of air hunger in terminal cancer patients in the last 6 weeks of life is greater than 70%. However, in non-cancer patients dyspnea is also the most prevalent respiratory symptom in the elderly near end-of-life. Despite being the most distressing symptom in dying patients, physicians have difficulty recognizing air hunger. Such lack of awareness is hardly surprising in view of the findings of the Study to Understand Prognoses and Preferences for Outcomes and Risks of Treatment (SUPPORT) which showed that only 47% of physicians knew their patients’ preferences regarding something as fundamentally important as CPR. The difficulty in recognizing air hunger in terminally ill patients has also been well described in the intensive care unit setting. Furthermore, physicians not only fail to recognize the presence of dyspnea, but also do a poor job estimating severity of this frightful symptom. While data exists showing a lack of correlation with physician assessments of dyspnea when compared to objective measures such as brain natriuretic peptide (BNP) for severity of congestive heart failure, little data exist examining how well physicians estimate severity of air hunger in terminally ill patients.

Once patients with air hunger are identified, symptom assessment tools are needed. Due to the complex pathophysiology of this symptom more than one assessment tool may be useful when treating patients with terminal dyspnea. These instruments should be simple to use for both the patient and the provider. In addition, more than one tool may be needed to assess for a more global picture of the patient’s symptoms. For example, an antecedent tool such as the ATS or MRC scale may help patients better explain how anxiety or social stressors may contribute to their air hunger. Mediator tools may help obtain a more accurate assessment of how the patient’s environment may contribute to severity of symptoms, and reaction tools can help assess response to interventions for terminal dyspnea. Use of these standardized tools can allow for reproducible assessments of the severity of symptoms and would greatly assist providers in the management of terminal air hunger.

An earlier study at our institution identified that air hunger in terminal patients was common and there was no standardized approach to these patients. We also found that no objective tools were used to quantify air hunger. There are few prospective studies of air hunger in terminal patients and the results of our retrospective survey stimulated the development of a prospective observational study to assess how we care for patients with air hunger at end-of-life. We specifically aimed to determine in a prospective fashion the prevalence of air hunger in patients with terminal conditions, to evaluate several measurement tools in assessing air hunger, to determine the awareness of the health care team as to their patient’s symptoms, and to observe the impact of therapies on air hunger.
Methods

This prospective, observational study was conducted at Walter Reed Army Medical Center, a military tertiary care hospital. Beneficiaries eligible for care at WRAMC include active duty service members, their dependents, retired service members, and dependents of retirees. The patient population is therefore comprised of men and women of all ages, races, and a broad spectrum of cultural backgrounds.

For 2 months, consecutive admissions to the internal medicine and hematology-oncology wards were evaluated by reviewing the hospital’s database. As demographic information was recorded, adult patients were evaluated for severe illnesses which put them at risk for short-term death. This was determined using a previously validated screening tool (see Table 1). Patients were excluded from enrollment if they were less than 18 years old, unable to give consent, and if they were admitted to the non-medical services, bone marrow transplant ward, intensive care unit, or coronary care unit.

Patients meeting enrollment criteria were asked for informed consent to participate. All subjects enrolled into the study voluntarily agreed to participate and gave written informed consent. In this population of severely ill patients, it was made clear to study subjects that they could withdraw from any part of the research study at any time. Once patient consent was obtained a screening question was asked, “Are you having any trouble with your breathing?” For those patients who denied dyspnea, demographic data were obtained using the computerized database and included co-morbid conditions, age, gender, race, medications on admission, and DNR/DNI status. Those patients who screened positive for dyspnea were given questionnaires (day #1) which included three different dyspnea scales: the VAS, the modified Borg Scale, and the ATS Shortness of Breath Scale. Additionally, the internal medicine resident caring for the patient was asked to complete the same three dyspnea scales based upon how they perceived their patient’s symptoms upon admission to the hospital. On day #2, patients were administered the same dyspnea questionnaires to assess for response to treatments administered for air hunger. Treatments given were at the discretion of the admitting physician and these treatments were recorded on day #2.

The Walter Reed Army Medical Center Clinical Investigation Committee and the Human Use Committee approved the research.

Data analysis and statistics

Continuous and ordinal data are summarized using means or medians with ranges, and selected proportions are presented with 95% confidence intervals (95% CI). Associations among dyspnea scales and age are examined using Spearman’s correlation coefficient. Changes in dyspnea scales are compared between groups (i.e. gender, race) using the Wilcoxon rank sum test or Kruskal–Wallis analysis of variance. Changes in dyspnea scales over time are compared using the Wilcoxon signed ranks test.

<table>
<thead>
<tr>
<th>Table 1. Medical record Do-Not-Resuscitate (DNR) Screening Tool11 (used as screening tool to identify patients at risk for short-term death).</th>
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<tbody>
<tr>
<td><strong>Cardiac</strong></td>
</tr>
<tr>
<td>1. CHF—NYHC III/IV</td>
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<tr>
<td>2. Valvular disease—NYHC III/IV symptoms or inoperable</td>
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<tr>
<td><strong>Pulmonary</strong></td>
</tr>
<tr>
<td>1. COPD—cor pulmonale, O2 dependent</td>
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<tr>
<td>2. IPF or ILD</td>
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<tr>
<td>3. Pulmonary HTN that is untreatable</td>
</tr>
<tr>
<td>1. Cirrhosis (class III/IV, variceal disease)</td>
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<tr>
<td><strong>Renal disease</strong></td>
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<tr>
<td>1. Chronic renal failure (not candidate for dialysis)</td>
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<tr>
<td><strong>Oncology</strong></td>
</tr>
<tr>
<td>2. Hematologic disorders (that no longer respond to therapy)</td>
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On admission median Borg, VAS, and ATS scores were 4/10, 4/10, and 3/4, respectively. All dyspnea scales improved during hospitalization (Borg $p = 0.007$, VAS $p < 0.0005$, ATS $p = 0.008$) and there was statistically significant agreement among Borg–VAS and Borg–ATS with a trend toward significance with ATS–VAS. Borg and VAS had excellent agreement (Spearmans’ $r = 0.80$, $p < 0.0005$, $n = 32$). Borg–ATS correlation was moderate ($r = 0.49$, $p = 0.005$), and ATS–VAS association was weak ($r = 0.35$, $p = 0.051$).

Physicians’ initial assessment of their patient’s dyspnea differed from patient scores by 3 points or more in Borg 11/32 (34%) and in VAS 16/32 (50%) (see Figure 1).

Treatments prescribed to treat patient’s air hunger included inhaled $\beta_2$-agonists and anticholinergics (69%), oxygen (65%), antibiotics (38%), respiratory therapy (34%), opiates (31%), tube thoracostomy (6%), thoracentesis (3%), and others (18%).

On day #2, patients showed clinically and statistically significant improvement in their dyspnea. Borg improved a median of 1 point (range: −3 to 8, $p = 0.007$), VAS improved 1.3 points (range: −4 to 7, $p < 0.0005$), and ATS improved 1.0 point (range: −2 to 4, $p = 0.008$). Improvement in Borg did not correlate with age, race, gender, smoking history, or specific treatments. Patients received a median of three treatments and change in dyspnea score did not correlate with the number of treatments received (see Figure 2).

### Discussion

The main finding of this study is a high prevalence (53%) of air hunger in severely ill hospitalized patients. This is not surprising given medical advances which allow patients to live longer with their terminal conditions. Continued advances in medicine, along with demographic trends, will likely result in more patients presenting with dyspnea late in the course of chronic terminal disease. The ability of physicians to recognize and evaluate each patient’s level of dyspnea and to choose effective treatments will be important for optimal management of this complex symptom.

This study also showed that physicians do a poor job of estimating the severity of dyspnea in their terminally ill patients. Objective assessment tools can be very valuable when used to evaluate air hunger. While there are many assessment tools available, we feel that the modified Borg Scale and the VAS provide reliable assessment tools that are easy to administer to patients with dyspnea and to interpret at the bedside. The agreement between these tools may stem from the fact that the modified Borg and VAS are both reaction tools. For terminally ill patients, reaction tools provide an effective and rapid way to evaluate changes in sensed work of breathing. As terminal dyspneic patients are often full of fear and anxiety, these tools can be ideal and comforting to patients, as they allow them to quickly relay to their provider the severity of symptoms and response to therapies given. These findings are consistent with the recent systematic reviews by Bauswein et al. and Dorman et al. regarding measurement tools for assessment of air hunger in the palliative setting. In our study, the ATS tool was not as useful. The ATS tool is both an antecedent and mediator tool. Perhaps the poor agreement of ATS with the other tools was due to the fact that it was compared to two reaction tools. We also found that ATS did not have the same ease of use in our severely ill patient population.

The lack of correlation between improvement in dyspnea and the number of treatments given suggests that treatments are best when individualized and tailored to each patient’s specific medical conditions. Alternatively, the improvement in dyspnea may be secondary to factors not measured in this study. Perhaps bed rest alone led to improvement in dyspnea, or perhaps sources of stress from outside of the hospital were diminished.

A limitation of this study is that it was performed at a tertiary care institution. Prevalence of air hunger might be different in a community-based, non-referral center. Another limitation is the exclusion of sicker patients who were unable to give consent. Inclusion of these patients may have demonstrated greater impact of therapy. Another potentially confounding factor stemmed from an ethical concern. If patients stated that they had problems with their breathing, this information was communicated to the medical team caring for the patient. This communication may have influenced therapeutic decisions by the team.

The dyspnea tools are not validated for surrogate ratings. However, the failure of physicians to estimate dyspnea...
reliably suggests that objective tools should be used to measure the symptom and to guide therapy. Although reliable objective tools exist, these instruments have not been part of clinical practice. We need to better educate health care personnel as to the prevalence of air hunger and make the objective tools both readily available and easy to use.

In summary, this study demonstrates that air hunger is prevalent in patients with terminal disease who are admitted to the hospital. Patient care will likely benefit from the use of objective measurement tools to assess the level of dyspnea. The modified Borg Scale and VAS are useful tools for this evaluation and we recommend their use. Patients' symptoms improve with hospitalization but there is no correlation between degree of improvement and the number or type of treatments implemented. Improvement may be due to multiple factors not measured in this study. Given its striking prevalence, air hunger and effective therapy for this frightening symptom deserve further study.

Conflict of interest statement

None of the authors have a conflict of interest to declare in relation to this work.

References