



MEASURING ONCOLOGY NURSING-SENSITIVE PATIENT OUTCOMES: EVIDENCE-BASED SUMMARY

1. **Outcome:** Dyspnea

2. **Category:** Symptom experience

3. **Definition:**

“Dyspnea is the subjective sensation of difficult or uncomfortable breathing.” (Gift, 1990, p.955)

“...dyspnea is a term used to characterize a subjective experience of breathing discomfort that consists of qualitative distinct sensations that vary in intensity. The experience derives from interactions among multiple physiological, psychological, social, and environmental factors, and may induce secondary physiological and behavioral responses.” (American Thoracic Society, 1999, p.322)

“The sensation of dyspnea is subjective and includes both the perception of labored breathing by the patient and the reaction to that sensation. Like pain, dyspnea is a sensory experience that is perceived, interpreted and rated solely by the patient himself.” (Carrieri, Janson-Bjerklie, and Jacobs, 1984, p.436)

Breathlessness may differ from dyspnea in that breathlessness is the sensation felt during exercise or excitement and may not be unpleasant. The unpleasant sensation of labored breathing usually associated with disease could be labeled “pathological” breathlessness, whereas the sensation felt by healthy subjects during exercise or excitement would be called “physiological” breathlessness (Carrieri & Janson-Bjerklie, 1986, p.191). However, in this document, both terms are used interchangeably as is consistent with the published work on dyspnea.



4. Integrated Reviews and Meta-Analyses

This list includes systematic reviews of dyspnea interventions published since 1996 that included patients with cancer and clearly identified the search strategy.

Booth, S., Wade, R., Johnson, M., Kite, S., Swannick, M., Anderson, H., et al. (2004). The use of oxygen in the palliation of breathlessness. A report of the expert working group of the Scientific Committee of the Association of Palliative Medicine. *Respiratory Medicine*, 98, 66-77. [PubMed Abstract](#)

Jennings, A. L., Davies, A. N., Higgins, J. P., & Broadley, K. (2001). Opioids for the palliation of breathlessness in terminal illness. [Cochrane review]. In the *Cochrane Library, Volume 4, 2001*. Oxford, UK: Update Software. [PubMed Abstract](#)

Jennings, A. L., Davies, A. N., Higgins, J. P., Gibbs, J. S., & Broadley, K. E. (2002). A systematic review of the use of opioids in the management of dyspnoea. *Thorax*, 57(11), 939-944. [PubMed Abstract](#)

Joyce, M., McSweeney, M., Carrieri-Kohlman, V. L., & Hawkins, J. (2004). The use of nebulized opioids in the management of dyspnea: evidence synthesis. *Oncology Nursing Forum*, 31, 551-561. [PubMed Abstract](#)

"ONS Member Access" link at <http://www.ons.org/publications/journals/ONF>

Sola, I., Thompson, E., Subirana, M., Lopez, C., & Pascual, A. (2004). Non-invasive interventions for improving well-being and quality of life in patients with lung cancer. [Cochrane Review]. In *The Cochrane Library, Volume 4, 2004* Oxford, UK: Update Software. [PubMed Abstract](#)

This list includes systematic reviews published since 1996 that clearly identified the search strategy of dyspnea interventions in adults with chronic obstructive pulmonary disease (COPD).

Devine, E. C., & Percy, J. (1996). Meta-analysis of the effects of psychoeducational care in adults with chronic obstructive pulmonary disease. *Patient Education and Counseling*, 29, 167-178. [PubMed Abstract](#)



Lacasse, Y., Brosseau, L., Milne, S., Martin, S., Wong, E., Guyatt, G. H., et al. (2002). Pulmonary rehabilitation for chronic obstructive pulmonary disease. [Cochrane Review]. In *The Cochrane Library*, Volume 3, 2002 Oxford, UK: Update Software. [PubMed Abstract](#)

Liesker, J. J., Wijkstra, P. J., Ten Hacken, N. H., Koeter, G. H., Postma, D. S., & Kerstjens, H. A. (2002). A systematic review of the effects of bronchodilators on exercise capacity in patients with COPD. *Chest*, 121, 597-608. [PubMed Abstract](#)

Salman, G. F., Mosier, M. C., Beasley, B. W., & Calkins, D. R. (2003). Rehabilitation for patients with chronic obstructive pulmonary disease: meta-analysis of randomized controlled trials. *Journal of General Internal Medicine*, 18, 213-221. [PubMed Abstract](#)

5. Guidelines and Standards

Dyspnea. Mechanisms, assessment, and management: a consensus statement. American Thoracic Society. (1999). *American Journal of Respiratory and Critical Care Medicine*, 159, 321-340.

Kvale, P. A., Simoff, M., & Prakash, U. B. (2003). Lung cancer: Palliative care. *Chest*, 123(1, Suppl.), 284S-311S.

National Comprehensive Cancer Network. (2004). Practice guidelines in oncology –v.1.2004. Palliative care. Retrieved January, 4, 2005 from <http://www.nccn.org/>.

6. Tables of Tools to Measure Oncology Nursing-Sensitive Patient Outcome: Dyspnea

These tables include instruments or tools that measure a person's subjective perception of dyspnea. They do not include items or subscales from other multidimensional symptom or quality-of-life instruments. The tables exclude physiologic parameters such as pulmonary function studies or measures of oxygen saturation that assess respiratory compromise. Attempts to correlate physiologic tests with subjective measurement of the severity of dyspnea are many, but no consistent evidence exists across disease entities.

Table 6A. Description of Tools

Name of tool	Author / Year	Domains or Factors	# of Items	Scaling	Scoring	Language
Baseline Dyspnea Index (BDI) or Transition Dyspnea Index (TDI)	Mahler et al., 1984	Severity of dyspnea in three different categories: functional impairment, magnitude of task, and magnitude of effort	3 categorical items assessed by observer interviewer then dyspnea graded from severe to unimpaired	BDI – 5 grade rating from 0 (severe) to 4 (unimpaired) TDI – change in dyspnea rated by seven grades ranging from -3 (major deterioration) to +3 (major improvement)	BDI has baseline focal score range from 0 to12. TDI has a transition focal score range from -9 to +9.	English
British Medical Research Council (BMRC) or Medical Research Council (MRC) Dyspnea scale And Modified MRC scale	Bestall et al., 1999 Mahler et al., 1987, 1988, 1989 (Secondary source)	Grades of breathlessness experienced with physical activities e.g. walking, hurrying on level ground, walking up hill	5 point scale self administered or by an interviewer	Categorical scale quantifying breathlessness in grades: 1 (I only get breathless with strenuous exercise) to 5 (I am too breathless to leave the house).	Grades 1-5	English
Cancer Dyspnoea Scale (CDS) **	Tanaka et al., 2000	Multidimensional nature of dyspnea (sense of effort, sense of anxiety, sense of discomfort)	12 items	5 point scale from 1 (not at all) to 5 (very much)	The maximum total score is 48: 20 points for sense of effort, 16 for sense of anxiety, and 12 for sense of discomfort. The higher the score, the more severe the dyspnea.	English Japanese

Name of tool	Author / Year	Domains or Factors	# of Items	Scaling	Scoring	Language
Chronic Respiratory Disease Questionnaire (CRQ)	Guyatt et al., 1987	Dyspnea, fatigue, emotional function, mastery (the feeling of control over disease)	20 items administered by interviewer	1 (extreme) to 7 (none or not at all) Likert categorical scale	Overall score can be reported for all four components. Author recommends scoring dyspnea separately and not including in overall score.	English
Modified Borg Scale (MBS)	Borg, G.V., 1982	Exertional dyspnea. Rating of perceived exertion (RPE) "suitable for determining other subjective symptoms such as breathing difficulties, aches and pains" (Borg, 1982, p.380)	Vertical 0 - 10+ item scale with words describing degrees of perceived exertion anchored to numbers	Categorical scale with ratio properties	One point in time value indicated by subject	English, French, German, Japanese, Hebrew, Russian
Oxygen-cost diagram (OCD)	McGavin et al. 1978	Daily activities corresponding to perceived increasing oxygen demand	100 mm vertical visual analog scale with 13 activities listed at various points along the line	Patient places mark on line corresponding to point above which they think their breathlessness would not let them go	Score is the distance of the mark in millimeters above zero	English
Pulmonary Function Status and Dyspnea Questionnaire (PFSDQ)	Lareau et al., 1994	Dyspnea intensity with activities and the effect of dyspnea on activities of daily life	164 item paper and pencil self-administered questionnaire	Dyspnea component: 0 to 10 numerical rating scale with the words none, mild, moderate and very severe at numbers 0, 3, 5, and 10 to rate dyspnea with each of 79 activities. Functional ability component: a Likert scale from 1 (as active as I've ever been) to 7 (have omitted entirely) to rate the degree to which activities have been modified at the present time compared with before the onset of COPD	Dyspnea Index is obtained by summing the dyspnea scores rated 7 or greater and an activity index is obtained by adding activity ratings 6 or greater	English



Name of tool	Author / Year	Domains or Factors	# of Items	Scaling	Scoring	Language
University of California, San Diego (UCSD) Shortness of Breath Questionnaire (SOBQ)	Eakin et al., 1998	ADL related shortness of breath	24 items	6 point Likert categorical scaling (0 = not at all to 5 = maximal or unable to do) to indicate severity of shortness of breath during 21 ADLs	Scored by summing responses across all 24 items to form total score (range 0-120)	English
Visual Analog Scale (VAS)**		Symptom intensity	1 item	100 mm line (either vertical or horizontal) with anchors at either end to indicate extremes of the sensation	Measuring the distance from the bottom of the scale (or left if it is horizontal) to the level indicated by the subject	

**This tool has evidence of either reliability or validity in patients with cancer. Most of the included tools report measurement of dyspnea in various respiratory diagnoses. When possible, the tables indicate if the tools measure dyspnea or exertional dyspnea.

Table 6B. Psychometric Properties of Tools

Name of tool	Populations	Reliability & Validity	Sensitivity	Clinical utility	Comment
Baseline Dyspnea Index (BDI) / Transition Dyspnea Index (TDI)	1. 38 patients with respiratory disease (Mahler et al., 1984) 2. 24 patients with obstructive airway disease (Mahler et al., 1987) 3. 153 patients with shortness of breath in various medical diseases (Mahler & Wells, 1988)	<u>Reliability</u> No data available <u>Validity</u> 1. Convergent: BDI correlated with 12 minute walk test (12 MW) ($r = 0.60, p < 0.001$) TDI correlated with 12 MW ($r = 0.33, p = 0.04$) 2. Convergent: Clinical ratings of dyspnea on BDI were highly correlated with Medical Research Council (MRC) and Oxygen-Cost Diagram (OCD) scales ($r = 0.79, -0.83$ and $0.71, p < 0.001$) (Mahler et al., 1987) 3. Scores from BDI correlated with MRC and OCD scales ($r = 0.48 - 0.70, p < 0.001$) (Mahler & Wells, 1988)		“The BDI is easy to administer and useful for measuring baseline dyspnea. The TDI may be best used to measure the effects of disease progression and the outcomes of treatment” (Scott, 2004, p. 529).	
British Medical Research Council (BMRC) or Medical Research Council (MRC) dyspnea scale and Modified MRC scale	1. 1,030 men answered questions on breathlessness and 994 performed spirometry in a study to determine the effect of inhaled cement dust on ventilatory function (Vestbo et al., 1988) 2. 24 patients with obstructive airway	<u>Reliability</u> No data available <u>Validity</u> 1. Construct Validity of four BMRC breathlessness questions is determined by multivariate logistic regression analysis with age, occupation category, body mass index (BMI)	Lack of clear limits between grades (American Thoracic Society [ATS], 1999); not sensitive enough to detect small but possibly significant symptomatic changes (van der Molen, 1995)	Assumes patient has some mobility	

Name of tool	Populations	Reliability & Validity	Sensitivity	Clinical utility	Comment
BMRC or MRC dyspnea scale and Modified MRC scale <i>(Continued)</i>	disease (Mahler et al., 1987) 3. 153 patients with shortness of breath in various medical diseases (Mahler & Wells, 1988) 4. 20 patients with interstitial lung disease (Mahler et al., 1989)	and one-second forced expiratory volume (FEV ¹). (Vestbo et al., 1988) 2. Convergent: Modified MRC scale was correlated highly ($r = 0.79, -0.83$ and -0.71 $p = 0.001$) with OCD and BDI scales (Mahler et al., 1987) 3. Convergent: Dyspnea scores on MRC, OCD, and BDI were significantly correlated ($r = 0.48 - 0.70$, $p < 0.001$) (Mahler & Wells, 1988) 4. Convergent: Values for breathlessness were significantly correlated (MRC vs OCD $r = -0.80$; MRC versus BDI $r = -0.87$, and OCD versus BDI $r = 0.70$; $p = 0.001$) (Mahler et al., 1989).			
Cancer Dyspnoea Scale (CDS)**	1. 166 adults with lung cancer (Tanaka et al., 2000) 2. 157 outpatients with lung cancer (Tanaka et al., 2002)	<u>Reliability</u> 1. Internal consistency: average Cronbach's alpha for three factors = 0.86. Test-retest correlation coefficients between each factor and the total score = 0.71, 0.69 and 0.58 respectively ($p < 0.005$) <u>Validity</u> 1. Intersubscale: correlations were significant with a mean		Simple and easy to complete. Administration of tool takes average 140 seconds (Tanaka et al., 2000). Difficulty is that it asks patients to rate dyspnea during the past few days which could be variable and confusing to the patient. May not be helpful to rate clinical change caused by treatment	

Name of tool	Populations	Reliability & Validity	Sensitivity	Clinical utility	Comment
CDS <i>(Continued)</i>		value of 0.48 Convergent: Significant correlation with VAS dyspnea ($r = 0.57$, $p < 0.001$) and with modified Borg scale ($r = 0.52$, $p < 0.001$) 2. Correlation between CDS and numerical dyspnea score (1-10) was 0.63 ($p < 0.001$).			
Chronic Respiratory Disease Questionnaire (CRQ)	1. 40 adults with chronic obstructive pulmonary disease (COPD) in a rehabilitation program (Wijkstra et al., 1994) 2. 28 patients with chronic airflow limitation (Guyatt et al., 1987) 3. 89 subjects with severe but stable COPD were randomized to either pulmonary rehabilitation (8 weeks inpatient and 16 weeks outpatient) or standard community care (Goldstein et al., 1994).	<u>Reliability</u> 1. Internal consistency: high reliability ($\alpha = 0.71-0.88$) and high test-retest reliability: (r not stated, $p > .90$) for dimensions fatigue, emotion, and mastery. Low internal consistency reliability ($\alpha = 0.53$) and test-retest reliability ($p = 0.73$) for dyspnea dimension (Wijkstra et al., 1994) <u>Validity</u> Convergent: Comparison was made between the dimensions of the CRQ and the symptom checklist SCL-90. Significant correlations ($p = 0.001$) were found among the dimensions of fatigue, emotions, and mastery and comparable domains	1. Initial testing supported responsiveness when the CRQ was repeated two weeks after discharge from rehabilitation program (Guyatt et al., 1987). 2. After pulmonary rehabilitation, significant mean differences existed for CRQ dyspnea and mastery ($p = 0.0061$ and 0.0002 , respectively) between the treatment and control groups (Goldstein et al., 1994).	Initial administration of questionnaire takes a maximum of 30 minutes and usually 15-25 minutes; follow-up administration takes a maximum of 20 minutes and usually 15-20 minutes (Guyatt et al., 1987). Has potential value in initial assessment, but may not detect small changes in repeated use.	Recommend for use in clinical trials for test-retest situations; the dyspnea-causing activities are identified by individual patients and make comparisons of dyspnea scores with other patients difficult. Wijkstra et al. (1994) suggested scoring the dyspnea items separately and not including dyspnea scores in overall score because of the low internal consistency/reliability of dyspnea items.

Name of tool	Populations	Reliability & Validity	Sensitivity	Clinical utility	Comment
CRQ (Continued)		of the SCL-90. However, the dyspnea dimension showed <u>no significant correlation</u> with the somatization dimension of the SCL-90.			
Modified Borg Scale (MBS)	<p>1. Six outpatient subjects with moderately severe COPD performed exercise testing weekly for 6 weeks (Mador, Rodis, & Magalang, 1995)</p> <p>2. 45 adults with asthma (13 men, 32 women) attending outpatient asthma clinic (Burdon et al., 1982)</p> <p>3. Five alert and oriented patients with restrictive, obstructive or both pulmonary disease (one with mesothelioma), who were receiving mechanical ventilation, quantified the severity of their dyspnea using Visual Analog Scale (VAS) and MBS (Lush et al., 1988).</p> <p>4. Nine older adult patients (age = 678 ± 4 years) with moderate</p>	<p><u>Reliability</u> Derived from original 15 grade Borg scale (6 - 20) with high correlations of heart rates ranging from 0.80 - 0.90 (Borg, 1982)</p> <p><u>Reproducibility</u> 1. Borg scores were not significantly different across study days during both maximal and submaximal exercise (no p value stated). In contrast, Borg score within subject coefficient of variation was significantly greater than physiologic indices (minute ventilation and oxygen consumption) demonstrating MBS measurement of dyspnea perception (Mador et al., 1995)</p> <p><u>Validity</u> 2. Convergent: close linear relationship (mean $r = 0.88 \pm 0.15$ SD) between breathlessness as indicated by MBS and</p>	<p>1. As the 12 MW progressed, mean Borg scores became higher whereas distances walked in two-minute intervals were similar. "Dyspnea as assessed by Borg scale is directly dependent on the duration of exercise" (Bernstein et al., 1994).</p> <p>2. After bronchodilator, the median Borg score declined from 3 to 1; however, no correlation existed between spirometry (FEV₁) and Borg score ($r = -0.08$), suggesting that Borg dyspnea ratings yield information about bronchodilator responsiveness that are not appreciated by spirometry alone (Wolkove et al., 1989)</p>	<p>Application in assessing reactions to routine activities is uncertain; most studies compare it with physiologic testing (van der Molen, 1995).</p> <p>"Strong positive and significant correlations between VAS and MBS suggest both scales are valid and reliable measures in the ventilated assisted patient in the critical care setting" (Lush et al., 1988 p. 534)</p>	<p>Burdon et al. (1982) was the first to adapt Modified Borg scale to assess the severity of breathlessness.</p> <p>Care must be taken to provide consistent, specific instructions when using the scale (ATS, 1999).</p> <p>Assesses dyspnea at one particular time point by a particular stimulus (Scott, 2004).</p>

Name of tool	Populations	Reliability & Validity	Sensitivity	Clinical utility	Comment
MBS (Continued)	COPD performed 12 MW in two-minute intervals with Borg score obtained at end of each two-minute walk (Bernstein et al., 1994) 5. 93 patients with obstructive lung disease rated breathlessness along with spirometry at rest and after bronchodilator (Wolkove et al., 1989)	decreased FEV ₁ (Burdon et al., 1982) 3. Convergent: VAS and MBS were highly correlated ($r = 0.92$, $p = 0.001$) in 189 pooled data points from the five patients (Lush et al., 1988)			
OCD	62 adult patients (44 with airway obstruction and 18 with pulmonary infiltration) (McGavin et al., 1978).	<u>Reliability</u> No data available <u>Validity</u> Distance walked in 12 MW correlated well with subjective assessments on OCD ($r = 0.68$; $p < 0.001$) (McGavin et al. 1978).	Discriminative measure to collect patient data that are quantified and interpreted as comparisons for ADL as well as between patient benchmarks (Cullen & Rodak, 2002)	Easily used; has pragmatic utility (ATS, 1999)	Not all patients engage in the activities listed on the continuum (ATS, 1999). Emphasizes ambulation and under-represents other ADL.
Pulmonary Function Status and Dyspnea Questionnaire (PFDSQ)	131 male patients with COPD admitted to a pulmonary rehabilitation program, average age 63.7 years (± 6.2 years) (Lareau et al., 1994)	<u>Reliability</u> Internal consistency: Total scale Cronbach's alpha coefficient for combined dyspnea and functional component was 0.91. Alpha coefficients for the dyspnea component Scales ranged from 0.88 – 0.94 (Lareau et al., 1994) <u>Validity</u> 1. Convergent validity: Patients reporting severe		"Useful to follow the progression of symptoms and their impact on functional ability and quality of life"(Lareau et al., 1994, p.249)	Further testing is needed in a heterogeneous sample that includes women.

Name of tool	Populations	Reliability & Validity	Sensitivity	Clinical utility	Comment
PFDSQ (Continued)		extremes of dyspnea and functional impairment (most or least) were compared with pulmonary function parameters using student t test. Those with significantly greater (no p value stated) dyspnea and functional loss had greater airway obstruction and lower exercise tolerance (as measured by Vo ² max) (Lareau et al., 1994)			
University of California, San Diego Shortness of Breath Questionnaire (SOBQ)	54 subjects (32 men, 22 women) in a pulmonary rehabilitation program with a variety of pulmonary diagnoses: COPD (n = 28), cystic fibrosis (n = 9), and post-lung transplant (n = 17) tested current SOBQ with previous version (Eakin et al., 1998)	<u>Reliability</u> Internal consistency: coefficient $\alpha = 0.96$, item total correlations ranged from 0.49 - 0.87. <u>Validity</u> Correlation of new and previous versions of SOBQ was excellent (0.96). Convergent validity: moderate to strong correlations with Borg scale ratings (previous SOBQ $r = 0.42$; new SOBQ $r = 0.45$)		"Useful clinical instrument to assess dyspnea during common ADLs in order to set goals for improvement in specific activities through pulmonary rehabilitation or other interventions" (Eakin et al., 1998, p.623)	
VAS**	1. 30 adult outpatients (17 men, 13 women) with lung cancer (Brown et al., 1986) 2. 68 adult inpatients and outpatients with	<u>Reliability</u> 1. Test-retest: by Wilcoxon signed ranks no significant difference between time 1 (T1) and time 2 (T2) for dyspnea	VAS demonstrates ability to detect small changes (ATS, 1999)	Suited to within subject repeated measures (vander Molen, 1995) 3. In comparing horizontal and vertical	Common problems encountered with administering the VAS are difficulty seeing line and anchors, as well as, forgetting how scale is

Name of tool	Populations	Reliability & Validity	Sensitivity	Clinical utility	Comment
VAS** <i>(Continued)</i>	<p>documented pulmonary disease who experienced shortness of breath (Janson-Bjerklie, et al., 1986)</p> <p>3. 11 asthmatic subjects who presented to the emergency department to be treated for an acute asthma attack (Gift, Plaut & Jacox, 1986)</p> <p>4. 6 male subjects with COPD rated both the sense of effort required to breathe and the degree of discomfort associated with breathing on a vertical VAS during exercise on a braked cycle (Mador & Kufel, 1992).</p>	<p>worst ($z = -1.83$ $p = 0.07$) and dyspnea usual ($z = -1.58$ $p = 0.13$) (Brown et al., 1986).</p> <p><u>Validity</u></p> <p>1. Convergent: moderate correlations with Karnofsky performance status usual dyspnea (T1 $r = 0.48$, $p = 0.007$, T2 $r = 0.45$, $p = 0.02$) and worst dyspnea (T1 $r = 0.50$, $p = 0.005$, T2 $r = 0.52$, $p = 0.002$) (Brown et al., 1986)</p> <p>2. Convergent: correlation with ATS 1978 Grade of Breathlessness Scale ($r = -0.40$, $p = 0.001$) (Janson-Bjerklie et al., 1986)</p> <p>3. convergent: correlation between horizontal VAS and vertical VAS ($r = 0.52 - 0.99$) (Gif et al., 1986)</p> <p>4. Convergent: VAS ratings of the sense of respiratory effort and discomfort were highly correlated in each subject ($r = 0.99 \pm 0.006$) (Mador & Kufel, 1992)</p>		<p>VAS, both considered valid measures of dyspnea intensity. 4 of 11 patients had difficulty using the horizontal scale, asking researcher to repeat directions whereas only one of these had difficulty with the vertical scale. (Gif, 1986; Gif et al., 1986).</p>	<p>ordered (ATS, 1999, p. 327)</p>

**This tool has evidence of either reliability or validity in patients with cancer. Most of the included tools report measurement of dyspnea in various respiratory diagnoses. When possible, the tables indicate if the tools measure dyspnea or exertional dyspnea.



7. References related to specific instruments to measure outcome

Baseline Dyspnea Index and Transition Dyspnea Index

Mahler, D.A., Faryniarz, K., Tomlinson, D., Colice, G.L., Robins, A.G., Olmstead, E.M., et al. (1992). Impact of dyspnea and physiologic function on general health status in patients with chronic obstructive pulmonary disease. *Chest*, *102*, 395-401.

Mahler, D.A., Rosiello, R.A., Harver, A., Lentine, T., McGovern, J.F., & Daubenspeck, J.A. (1987). Comparison of clinical dyspnea ratings and psychophysical measurements of respiratory sensation in obstructive airway disease. *American Review of Respiratory Disease*, *135*, 1229-1233.

Mahler, D.A., Weinberg, D.H., Wells, C.K., & Feinstein, A.R. (1984). The measurement of dyspnea. Contents, interobserver agreement, and physiologic correlates of two new clinical indexes. *Chest*, *85*, 751-758.

Mahler, D.A., & Wells, C.K. (1988). Evaluation of clinical methods for rating dyspnea. *Chest*, *93*, 580-586.

British Medical Research Council (BMRC) Dyspnea Scale and Modified MRC Scale

Bestall, J. C., Paul, E. A., Garrod, R., Garnham, R., Jones, P. W., & Wedzicha, J. A. (1999). Usefulness of the Medical Research Council (MRC) dyspnoea scale as a measure of disability in patients with chronic obstructive pulmonary disease. *Thorax*, *54*, 581-586.

Mahler, D. A., Harver, A., Rosiello, R., & Daubenspeck, J. A. (1989). Measurement of respiratory sensation in interstitial lung disease. Evaluation of clinical dyspnea ratings and magnitude scaling. *Chest*, *96*, 767-771.

Mahler, D.A., Rosiello, R.A., Harver, A., Lentine, T., McGovern, J.F., & Daubenspeck, J.A. (1987). Comparison of clinical dyspnea ratings and psychophysical measurements of respiratory sensation in obstructive airway disease. *American Review of Respiratory Disease*, *135*, 1229-1233.

Mahler, D.A., & Wells, C.K. (1988). Evaluation of clinical methods for rating dyspnea. *Chest*, *93*, 580-586.

Vestbo, J., Knudsen, K.M., & Rasmussen, F.V. (1988). Should we continue using questionnaires on breathlessness in epidemiologic surveys? *American Review of Respiratory Disease*, *137*, 1114-1118.



Cancer Dyspnoea Scale

- Tanaka, K., Akechi, T., Okuyama, T., Nishiwaki, Y., & Uchitomi, Y. (2000). Development and validation of the CancerDyspnoea Scale: a multidimensional, brief, self-rating scale. *British Journal of Cancer*, *82*, 800-805.
- Tanaka, K., Akechi, T., Okuyama, T., Nishiwaki, Y., & Uchitomi, Y. (2002). Prevalence and screening of dyspnea interfering with daily life activities in ambulatory patients with advanced lung cancer. *Journal of Pain Symptom Management*, *23*, 484-489.

Chronic Respiratory Disease Questionnaire

- Goldstein, R.S., Gort, E.H., Stubbing, D., Avendano, M.A., & Guyatt, G.H. (1994). Randomised controlled trial of respiratory rehabilitation. *Lancet*, *344*, 1394–1397.
- Guyatt, G.H., Berman, L.B., Townsend, M., Pugsley, S.O., & Chambers, L.W. (1987). A measure of quality of life for clinical trials in chronic lung disease. *Thorax*, *42*, 773–778.
- Wijkstra, P.J., TenVergert, E.M., Van Altena, R., Otten, V., Postma, D.S., Kraan, J., et al. (1994). Reliability and validity of the chronic respiratory questionnaire (CRQ). *Thorax*, *49*, 465–467.

Modified Borg Scale

- Bernstein, M.L., Despars, J.A., Singh, N.P., Avalos, K., Stansbury, D.W., & Light, R.W. (1994). Reanalysis of the 12-minute walk in patients with chronic obstructive pulmonary disease. *Chest*, *105*, 163–167.
- Borg, G.A. (1982). Psychophysical bases of perceived exertion. *Medicine and Science in Sports and Exercise*, *14*, 377–381.
- Burdon, J.G., Juniper, E.F., Killian, K.J., Hargreave, F.E., & Campbell, E.J. (1982). The perception of breathlessness in asthma. *American Review of Respiratory Disease*, *126*, 825–828.
- Lush, M.T., Janson-Bjerklie, S., Carrieri, V.K., & Lovejoy, N. (1988). Dyspnea in the ventilator-assisted patient. *Heart and Lung*, *17*, 528–535.
- Mador, M.J., & Kufel, T.J. (1992). Reproducibility of visual analog scale measurements of dyspnea in patients with chronic obstructive pulmonary disease. *American Review of Respiratory Disease*, *146*, 82–87.



Mador, J.M., Rodis, A., & Magalang, U.J. (1995). Reproducibility of borg scale measurements of dyspnea during exercise in patients with COPD. *Chest*, 107, 1590-1597.

Wolkove, N., Dajczman, E., Colacone, A., & Kreisman, H. (1989). The relationship between pulmonary function and dyspnea in obstructive lung disease. *Chest*, 96, 1247 - 1251.

Oxygen-Cost Diagram

McGavin, C. R., Artvinli, M., Naoe, H., & McHardy, G. J. (1978). Dyspnoea, disability, and distance walked: comparison of estimates of exercise performance in respiratory disease. *BMJ*, 2, 241 - 243.

Pulmonary Functional Status and Dyspnea Questionnaire

Lareau, S. C., Carrieri-Kohlman, V., Janson-Bjerklie, S., & Roos, P. J. (1994). Development and testing of the Pulmonary Functional Status and Dyspnea Questionnaire (PFSDQ). *Heart and Lung*, 23, 242 - 250.

University of California, San Diego, Shortness of Breath Questionnaire

Eakin, E.G., Resnikoff, P.M., Prewitt, L.M., Ries, A.L., & Kaplan, R.M. (1998). Validation of a new dyspnea measure: The UCSD Shortness of Breath Questionnaire. University of California, San Diego. *Chest*, 113, 619–624.

Visual Analogue Scale

**Brown, M.L., Carrieri, V., Janson, B., & Dodd, M.J. (1986). Lung cancer and dyspnea: the patient's perception. *Oncology Nursing Forum*, 13, 19–24.

"ONS Member Access" link at <http://www.ons.org/publications/journals/ONF>

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Mador, M.J., & Kufel, T.J. (1992). Reproducibility of visual analog scale measurements of dyspnea in patients with chronic obstructive pulmonary disease. *American Review of Respiratory Disease*, 146, 82–87.

**This tool has evidence of either reliability or validity in patients with cancer. Most of the included tools report measurement of dyspnea in various respiratory diagnoses. When possible, the tables indicate if the tools measure dyspnea or exertional dyspnea.

One additional instrument (ATS-DLD) 78 was identified in the literature as a respiratory epidemiological questionnaire. This tool is not included in the reference table because full information was not available, but it is listed here. Imbedded in this tool is a question that grades the degree to which a person's breathlessness interferes with mobility and function. The "Grade of Breathlessness Scale" is based on revisions of the British Medical Research Council questionnaire and is described in the tables under that instrument.

American Thoracic Society-Division Lung Diseases (ATS-DLD) 78 Questionnaire

Comstock, G.W., Tockman, M.S., Helsing, K.J., & Hennesy, K.M. (1979). Standardized respiratory questionnaires: Comparison of the old with the new. *American Review of Respiratory Disease*, 119, 45–53.

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Reviews of Dyspnea Measurement Instruments

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McCord, M., & Cronin-Stubbs, D. (1992). Operationalizing dyspnea: Focus on measurement. *Heart and Lung*, 21, 167–179.

Sidani, S. (2003). Symptom management. In D.M. Doran (Ed.), *Nursing-sensitive outcomes* (pp. 115–175). Sudbury, MA: Jones and Bartlett.

Scott, M.L. (2004). Measuring dyspnea. In M. Frank-Stromborg & S.J. Olsen (Eds.), *Instruments for clinical health-care research* (3rd ed., pp. 523–534). Sudbury, MA: Jones and Bartlett.

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8. Summary of Key Evidence That Nursing Interventions Influence This Outcome and Gaps in Current Evidence Base

This section is based on a review of the integrated reviews and meta-analyses published on dyspnea (see Section 4) and highlights evidence that nursing interventions influence dyspnea management. Gaps in existing knowledge and recommendations for research are identified.

A. Evidence that nursing interventions influence dyspnea in adults with a cancer diagnosis

- In studies that included palliative care patients with any illness including cancer and that compared opioid drugs by any route with placebo, evidence exists in favor of continuing to use oral or parenteral opioid drugs to treat breathlessness (Jennings et al., 2001; Jennings et al., 2002).
 1. Currently, consistent evidence is lacking in support of the use of opioids to improve exercise tolerance (Jennings et al., 2001; Jennings et al., 2002).
 2. No evidence supports the use of nebulized opioids for the treatment of breathlessness (Jennings et al., 2001; Jennings et al., 2002; Joyce et al., 2004).
 - i. In studies, that included palliative care patients with any illness including cancer, that compared opioid drugs by any route with placebo, there is evidence in favor of continuing to use oral or parenteral opioid drugs to treat breathlessness.
 1. There is currently a lack of consistent evidence in support of the use of opioids to improve exercise tolerance.
 2. There is no evidence to support the use of nebulised opioids for the treatment of breathlessness.
- Oxygen may be helpful for the palliation of breathlessness in some patients with advanced cancer, but little evidence exists to enable clinicians to predict which patients will benefit (Booth et al., 2004).
- Initial but limited evidence in patients of either gender and any age diagnosed with any stage lung cancer suggests that nurse-led breathing programs produce overall beneficial effect on levels of dyspnea (Sola et al., 2004).

“Breathing programme is a care package including:

- i) Detailed assessment of breathlessness together with exacerbating/ ameliorating factors
- ii) Advice and support on ways of managing breathlessness
- iii) Exploration with the patient of the meaning of their breathlessness, their disease and their view of the future
- iv) Training in relaxation techniques and breathing re-training
- v) Goal setting for achieving functional and social activities and to support the development of coping strategies
- vi) Recognition of problems needing medical attention” (Sola, 2004, p.20).

B. Evidence that nursing interventions influence dyspnea in adults with COPD

Rationale for including evidence related to nursing interventions that influence dyspnea measured in adults with COPD

The rationale for including evidence related to nursing interventions that influence dyspnea in adults with COPD is that often the risk factor of tobacco use is common to both cancer and restrictive or obstructive lung disease. Dyspnea in a person with cancer often has multiple etiologies, some related to the cancer diagnosis, cancer treatment, and other possible underlying problems (Dudgeon & Lertzman, 1998; Dudgeon, Kristjanson, Sloan, Lertzman, & Clement, 2001). Nursing-sensitive outcome evidence exists in the well-studied COPD population and may have utility in the cancer population if patients have a coexisting or comorbid COPD diagnosis.

- Evidence suggests that progressive muscle relaxation has large beneficial effect on dyspnea (Devine & Percy, 1996).
- The role of respiratory rehabilitation has been supported strongly in the treatment of patients with COPD. Rehabilitation that includes exercise training (at least lower-extremity training) improves dyspnea (Devine & Percy, 1996, Lacasse et al., 2002; Salman et al., 2003).
- For patients with COPD, limited evidence suggests that bronchodilator therapy (β -agonists and anticholinergics) improves dyspnea ratings in steady state exercise (Liesker et al., 2002).



C. Gaps in evidence

- The evidence about the effect of oral and parenteral opioids is limited to the doses and dosing schedules in the Jennings et al. (2001) meta-analysis. Studies in the review are more than 10 years old and use drugs that are less commonly prescribed today.
- A need exists for further research about the use of nebulized opioids involving larger samples that are stratified according to prior opioid use.
- The adverse effects of oxygen therapy include restriction of activities, possible mobility limitation, and cost. In the absence of hypoxemia, no standard formal assessment or agreed-upon testing procedure exists to determine the benefit of oxygen at rest.
- The nurse-led breathing program reported by Sola et al. (2004) included many components. Researchers do not know which component is the most significant or how each component contributes to reduce dyspnea.
- Some interventions show evidence of effect in reducing breathlessness in people with COPD, but no evidence exists to demonstrate the outcome in patients with cancer.

9. Recommendations

This section is based on a review of the cited meta-analyses, integrated reviews, and clinical practice guidelines published on dyspnea (see Section 4 & 5).

Practice - Multiple factors, such as but not limited to, anemia, anxiety, ascites, asthma, cachexia, chronic obstructive or restrictive pulmonary disease, heart failure, hepatomegaly, neuromuscular disease, obesity, pneumonectomy or a partial resection of a lung and thyrotoxicosis can cause or contribute to dyspnea (Dudgeon & Lertzman, 1998; Dudgeon, Kristjanson, Sloan, Lertzman, & Clement, 2001). The optimal treatment of dyspnea is to treat reversible causes with specific therapies and to use palliative therapies to treat irreversible causes for symptomatic relief (American Thoracic Society, 1999).

- Assess for the presence of reversible causes of dyspnea and institute therapy as indicated and appropriate.
- Evaluate dyspnea with an instrument or tool that is sensitive to patients' clinical situations.
- Document assessment and reassessment to measure response to interventions.



- A trial of an oral or parenteral opioid is indicated to treat acute exacerbations of dyspnea (American Thoracic Society, 1999; Jennings et al., 2001; Jennings et al., 2002).
- Measure oxygen saturation at rest and with exertion, if feasible, to assess for hypoxia-induced dyspnea. Provide supplemental oxygen as indicated (Booth et al., 2004).
- In the absence of hypoxia, determine whether oxygen therapy provides dyspnea relief, per patients' perceptions (Booth et al., 2004).
- Refer to a pulmonary rehabilitation program if COPD is a contributing factor to dyspnea and if rehabilitation is a feasible goal (Salman et al., 2003).

Education

- Patients with dyspnea should receive education in relaxation techniques (including progressive muscle relaxation) and breathing retraining, if appropriate to the clinical situation (Devine & Pearcy, 1996).

Research

- Evaluate the reliability and validity of tools to measure dyspnea in screening populations and in diverse cancer populations stratified according to early- or advanced-stage disease.
- Conduct integrated reviews and meta-analysis of the impact of dyspnea on function and quality of life and focus this analysis research on patients with cancer.
- Include disparity variables such as race, ethnicity, and gender and variables of quality of life and effect on functional status in dyspnea clinical research studies.
- Conduct studies to test appropriate drug, dose, and schedule of opioid to relieve dyspnea. Future research should isolate common opioids such as morphine, oxycodone, or fentanyl and evaluate the effectiveness to reduce breathlessness with respect to dosage and scheduling.
- Develop and test a standardized assessment process to determine the effectiveness of oxygen therapy in the presence and absence of hypoxemia.
- Develop and test psychoeducational breathing interventions to reduce dyspnea. Research is needed to determine which component is most significant or how each component contributes to reducing dyspnea.
- Measure the effectiveness of dyspnea interventions as they relate to changes in symptoms and effect on functional status and quality of life.
- For all interventions that show evidence of effect in reducing breathlessness in patients with COPD, research is needed to demonstrate the outcomes in patients with cancer.



10. Links

American Thoracic Society (<http://www.thoracic.org/>)

National Comprehensive Cancer Network (<http://www.nccn.org/>)

Oncology Nursing Society (<http://onsopcontent.ons.org/toolkits/evidence/Topic/dyspnea.asp>)

11. Current Research

ONS Foundation-funded research (<http://www.ons.org/research/funding/projects/index.shtml>)

NIH funded research (<http://crisp.cit.nih.gov/>)

“Continuous Measurement of Breathlessness” and “Standardized Indices of Breathlessness,” John Baird, Psychological Applications, LLC., Waterbury, VT.

“Efficacy of Yoga for Self-Management of Dyspnea in COPD,” Virginia Carrieri-Kohlman, University of California San Francisco.

“Exercise Adherence in Adults with Chronic Lung Disease,” Amy Tsang, University of Arizona, Tucson, AZ.

“Improving health-related quality of life outcomes,” (nurse coached inspiratory muscle training in people with congestive heart failure) Evelyn Yeaw, University of Rhode Island, Kingston, RI.

“Upper Body Strength Training in COPD,” Janet Larson, University of Illinois at Chicago.

International Cancer Research Portfolio (<http://www.cancerportfolio.org/>)

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