

Revised
2010
Supplement
Enclosed

March 2005

Nursing Best Practice Guideline
Shaping the future of Nursing

*Nursing Care of Dyspnea: **The 6th Vital Sign in**
Individuals with Chronic Obstructive
Pulmonary Disease (COPD)*



RNAO

Registered Nurses' Association of Ontario
L'Association des infirmières et infirmiers
autorisés de l'Ontario

NURSING BEST PRACTICE GUIDELINES PROGRAM



Greetings from Doris Grinspun
Executive Director
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It is with great excitement that the Registered Nurses' Association of Ontario (RNAO) disseminates this nursing best practice guideline to you. Evidence-based practice supports the excellence in service that nurses are committed to deliver in our day-to-day practice.

We offer our endless thanks to the many institutions and individuals that are making RNAO's vision for Nursing Best Practice Guidelines (NBPGs) a reality. The Government of Ontario recognized RNAO's ability to lead this program and is providing multi-year funding. Tazim Virani – NBPG program director – with her fearless determination and skills, is moving the program forward faster and stronger than ever imagined. The nursing community, with its commitment and passion for excellence in nursing care, is providing the knowledge and countless hours essential to the creation and evaluation of each guideline. Employers have responded enthusiastically to the request for proposals (RFP), and are opening their organizations to pilot test the NBPGs.

Now comes the true test in this phenomenal journey: Will nurses utilize the guidelines in their day-to-day practice?

Successful uptake of these NBPGs requires a concerted effort of four groups: nurses themselves, other healthcare colleagues, nurse educators in academic and practice settings, and employers. After lodging these guidelines into their minds and hearts, knowledgeable and skillful nurses and nursing students need healthy and supportive work environments to help bring these guidelines to life.

We ask that you share this NBPG, and others, with members of the interdisciplinary team. There is much to learn from one another. Together, we can ensure that Ontarians receive the best possible care every time they come in contact with us. Let's make them the real winners of this important effort!

RNAO will continue to work hard at developing and evaluating future guidelines. We wish you the best for a successful implementation!

Doris Grinspun, RN, MSN, PhD(cand), OOnt



Executive Director
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How to Use this Document

This nursing best practice guideline is a comprehensive document providing resources necessary for the support of evidence-based nursing practice. The document needs to be reviewed and applied, based on the specific needs of the organization or practice setting/environment, as well as the needs and wishes of the client. Guidelines should not be applied in a “cookbook” fashion but used as a tool to assist in decision making for individualized client care, as well as ensuring that appropriate structures and supports are in place to provide the best possible care.

Nurses, other healthcare professionals and administrators who are leading and facilitating practice changes will find this document valuable for the development of policies, procedures, protocols, educational programs, assessments and documentation tools. It is recommended that the nursing best practice guidelines be used as a resource tool. Nurses providing direct client care will benefit from reviewing the recommendations, the evidence in support of the recommendations and the process that was used to develop the guidelines. However, it is highly recommended that practice settings/environments adapt these guidelines in formats that would be user-friendly for daily use. This guideline has some suggested formats for such local adaptation and tailoring.

Organizations wishing to use the guideline may decide to do so in a number of ways:

- Assess current nursing and healthcare practices using the recommendations in the guideline.
- Identify recommendations that will address identified needs or gaps in services.
- Systematically develop a plan to implement the recommendations using associated tools and resources.

RNAO is interested in hearing how you have implemented this guideline. Please contact us to share your story. Implementation resources will be made available through the RNAO website at www.rnao.org/bestpractices to assist individuals and organizations to implement best practice guidelines.

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Further details are available from the Registered Nurses' Association of Ontario.



Nursing Care of Dyspnea: The 6th Vital Sign in Individuals with Chronic Obstructive Pulmonary Disease (COPD)

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Acknowledgement

Stakeholders representing diverse perspectives were solicited for their feedback and the Registered Nurses' Association of Ontario wishes to acknowledge the following for their contribution in reviewing this Nursing Best Practice Guideline.

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Nursing Care of Dyspnea: The 6th Vital Sign in Individuals with Chronic Obstructive Pulmonary Disease (COPD)

Disclaimer

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Registered Nurses' Association of Ontario (2005). *Nursing Care of Dyspnea: The 6th Vital Sign in Individuals with Chronic Obstructive Pulmonary Disease (COPD)*. Toronto, Canada: Registered Nurses' Association of Ontario.

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Summary of Recommendations

RECOMMENDATION		*LEVEL OF EVIDENCE
Practice Recommendations		
Assessment	1.0 Nurses will acknowledge and accept the patients' self-report of dyspnea.	IV
	1.1 All individuals identified as having dyspnea related to COPD will be assessed appropriately. Respiratory assessment should include: <ul style="list-style-type: none"> ■ Level of dyspnea <ul style="list-style-type: none"> ● Present level of dyspnea ● Present dyspnea should be measured using a quantitative scale such as a visual analogue or numeric rating scale ■ Usual level of dyspnea <ul style="list-style-type: none"> ● Usual dyspnea should be measured using a quantitative scale such as the Medical Research Council (MRC) Dyspnea Scale ■ Vital signs ■ Pulse oximetry ■ Chest auscultation ■ Chest wall movement and shape/abnormalities ■ Presence of peripheral edema ■ Accessory muscle use ■ Presence of cough and/or sputum ■ Ability to complete a full sentence ■ Level of consciousness 	IV
	1.2 Nurses will be able to identify stable and unstable dyspnea, and acute respiratory failure.	IV
	1.3 Every adult with dyspnea who has a history of smoking and is over the age of 40 should be screened to identify those most likely to be affected by COPD. As part of the basic dyspnea assessment, nurses should ask every patient: <ul style="list-style-type: none"> ■ Do you have progressive activity-related shortness of breath? ■ Do you have a persistent cough and sputum production? ■ Do you experience frequent respiratory tract infections? 	IV
	1.4 For patients who have a history of smoking and are over the age of 40, nurses should advocate for spirometric testing to establish early diagnosis in at risk individuals.	IV

*See pg. 13 for details regarding "Interpretation of Evidence".

	RECOMMENDATION	LEVEL OF EVIDENCE
COPD Dyspnea Interventions/ Education	<p>2.0 Nurses will be able to implement appropriate nursing interventions for all levels of dyspnea including acute episodes of respiratory distress:</p> <ul style="list-style-type: none"> ■ Acknowledgement and acceptance of patients' self-report of present level of dyspnea ■ Medications ■ Controlled oxygen therapy ■ Secretion clearance strategies ■ Non-invasive and invasive ventilation modalities ■ Energy conserving strategies ■ Relaxation techniques ■ Nutritional strategies ■ Breathing retraining strategies 	IV
	2.1 Nurses must remain with patients during episodes of acute respiratory distress.	IV
	<p>2.2 Smoking cessation strategies should be instituted for patients who smoke:</p> <ul style="list-style-type: none"> ■ Refer to RNAO (2003a) guideline, <i>Integrating Smoking Cessation into Daily Nursing Practice</i>. ■ Use of nicotine replacement and other smoking cessation modalities during hospitalization for acute exacerbation. 	IV
Medications	<p>3.0 Nurses should provide appropriate administration of the following pharmacological agents as prescribed:</p> <ul style="list-style-type: none"> ■ Bronchodilators (Level of Evidence = 1b) <ul style="list-style-type: none"> ● Beta 2 Agonists ● Anticholinergics ● Methylxanthines ■ Oxygen (Level of Evidence = 1b) ■ Corticosteroids (Level of Evidence = 1b) ■ Antibiotics (Level of Evidence = 1a) ■ Psychotropics (Level of Evidence = IV) ■ Opioids (Level of Evidence = IV) 	
	3.1 Nurses will assess patients' inhaler device technique to ensure accurate use. Nurses will coach patients with sub-optimal technique in proper inhaler device technique.	1a
	<p>3.2 Nurses will be able to discuss the main categories of medications with their patients including:</p> <ul style="list-style-type: none"> ■ Trade and generic names ■ Indications ■ Doses ■ Side effects ■ Mode of administration ■ Pharmacokinetics ■ Nursing considerations 	IV
Vaccination	3.3 Annual influenza vaccination should be recommended for individuals who do not have a contraindication.	1a
	3.4 COPD patients should receive a pneumococcal vaccine at least once in their lives (high risk patients every 5 to 10 years).	IV

	RECOMMENDATION	LEVEL OF EVIDENCE
Oxygen Therapy	4.0 Nurses will assess for hypoxemia/hypoxia and administer appropriate oxygen therapy for individuals for all levels of dyspnea.	1b-IV
Disease Self-Management	5.0 Nurses should support disease self-management strategies including: <ul style="list-style-type: none"> ■ Action plan development (Level of Evidence = 1b) <ul style="list-style-type: none"> ● Awareness of baseline symptoms and activity level ● Recognition of factors that worsen symptoms ● Early symptom recognition of acute exacerbation/infection ■ End-of-life decision-making/advanced directives (Level of Evidence = IV) 	
	5.1 Nurses should promote exercise training.	IV
	5.2 Nurses should promote pulmonary rehabilitation.	1a
Education Recommendation		
	6.0 Nurses working with individuals with dyspnea related to COPD will have the appropriate knowledge and skills to: <ul style="list-style-type: none"> ■ Recognize the importance of individual's self report of dyspnea ■ Provide COPD patient education including: <ul style="list-style-type: none"> ● Smoking cessation strategies ● Pulmonary rehabilitation/exercise training ● Secretion clearance strategies ● Breathing retraining strategies ● Energy conserving strategies ● Relaxation techniques ● Nutritional strategies ● Role/rationale for oxygen therapy ● Role/rationale for medications ● Inhaler device techniques ● Disease self-management and action plans ● End-of-life issues ■ Conduct appropriate referrals to physician and community resources 	IV
Organization & Policy Recommendations		
Organization & Policy	7.0 Organizations must institutionalize dyspnea as the 6th vital sign.	IV
	7.1 Organizations need to have in place COPD educators to teach both nurses and patients.	IV
	7.2 Organizations need to ensure that a critical mass of health professionals are educated and supported to implement this guideline in order to ensure sustainability.	IV
	7.3 Organizations will ensure sufficient nursing staff to provide essential care, safety and support for individuals with all levels of dyspnea.	IV
	7.4 Organizations should have available sample medication delivery devices, spacer devices, sample templates of action plans, visual analogue scales, numeric rating scales, MRC scales and patient education materials.	IV

	RECOMMENDATION	LEVEL OF EVIDENCE
	<p>7.5 Organizations need to have in place best practice guideline specific strategies to facilitate implementation. Organizations may wish to develop a plan for implementation that includes:</p> <ul style="list-style-type: none"> ■ A process for the assessment of the patient population (e.g., numbers, clinical diagnostic practices, co-morbidities, average length of stay) of individuals usually cared for in their institution that are living with dyspnea related to COPD. ■ A process for the assessment of documentation practices related to the monitoring of dyspnea (usual and present dyspnea and dyspnea related therapies (e.g., SpO₂). ■ A process for the evaluation of the changes in the patient population and documentation strategies pre- and post-implementation. ■ A process for the assessment of policies supporting the care of individuals living with dyspnea related to COPD. 	IV
	<p>7.6 Organizations need to develop specific pre-implementation and outcome markers to monitor the impact of the implementation of this guideline on the care of individuals with dyspnea related to COPD. Organizations may wish to evaluate:</p> <ul style="list-style-type: none"> ■ Nursing knowledge base pre- and post-implementation. ■ Length of time between acute exacerbations of COPD (AECOPD) for specific individuals (perhaps globally represented by the number of acute care admissions and/or use of acute care resources over time pre- and post-implementation). ■ Development of documentation strategies to monitor and enhance care of individuals living with dyspnea related to COPD (integration of usual and present dyspnea on vital sign records within the institution). ■ Development of policies institutionalizing an education program for nurses caring for individuals living with dyspnea related to COPD. 	IV
	<p>7.7 Nursing best practice guidelines can be successfully implemented only where there are adequate planning, resources, organizational and administrative support. Organizations may wish to develop a plan for implementation that includes:</p> <ul style="list-style-type: none"> ■ An assessment of organizational readiness and barriers to education. ■ Involvement of all members (whether in a direct or indirect supportive function) who will contribute to the implementation process. ■ Dedication of a qualified individual to provide the support needed for the education and implementation process. ■ Ongoing opportunities for discussion and education to reinforce the importance of best practices. ■ Opportunities for reflection on personal and organizational experience in implementing guidelines. <p>In this regard, RNAO (through a panel of nurses, researchers and administrators) has developed the <i>Toolkit: Implementation of Clinical Practice Guidelines</i>, based on available evidence, theoretical perspectives and consensus. The RNAO strongly recommends the use of this <i>Toolkit</i> for guiding the implementation of the best practice guideline on <i>Nursing Care of Dyspnea: The 6th Vital Sign in Individuals with Chronic Obstructive Pulmonary Disease (COPD)</i>.</p>	IV

	RECOMMENDATION	LEVEL OF EVIDENCE
Programs/Services	8.0 Pulmonary rehabilitation programs must be available for individuals with COPD to enhance quality of life and reduce healthcare costs.	1a
	8.1 Palliative care services must be available for individuals living with COPD and their caregivers.	III
	8.2 Nursing research related to interventions for individuals with COPD must be supported.	IV
	8.3 All Nursing programs should include dyspnea associated with COPD as one context for learning core curricula concepts.	IV
	8.4 Funding regulations for oxygen therapy must be revisited to include those individuals with severe dyspnea, reduced ventilatory capacity and reduced exercise tolerance who do not qualify under the current criteria.	IV

Interpretation of Evidence

Levels of Evidence

Ia Evidence obtained from meta-analysis or systematic review of randomized controlled trials.

Ib Evidence obtained from at least one randomized controlled trial.

IIa Evidence obtained from at least one well-designed controlled study without randomization.

IIb Evidence obtained from at least one other type of well-designed quasi-experimental study, without randomization.

III Evidence obtained from well-designed non-experimental descriptive studies, such as comparative studies, correlation studies, and case studies.

IV Evidence obtained from expert committee reports or opinions and/or clinical experiences of respected authorities.

Evidence obtained from qualitative inquiry was included throughout this guideline. Although recognized as important evidence that is “transformational” in its contribution to the nurse’s understanding of best practice, universally accepted strategy comparable to the systems developed for the interpretation of quantitative evidence do not yet exist (Sandelowski, 2004).

Responsibility for Guideline Development

The Registered Nurses' Association of Ontario (RNAO), with funding from the Government of Ontario, has embarked on a multi-year program of nursing best practice guideline development, pilot implementation, evaluation and dissemination. In this fifth cycle of the program, one of the areas of emphasis is on the care of patients with dyspnea associated with chronic obstructive pulmonary disease (COPD). This guideline was developed by a panel of nurses convened by the RNAO, conducting its work independent of any bias or influence from the Government of Ontario.

Purpose & Scope

Best practice guidelines (BPG) are systematically developed statements to assist practitioners and patients in decision making about appropriate healthcare (Field & Lohr, 1990). This guideline, *Nursing Care of Dyspnea: The 6th Vital Sign in Individuals with COPD*, will address the nursing assessment and management of stable, unstable and acute dyspnea associated with COPD.

The guideline focuses its recommendations on four areas: (1) Practice Recommendations directed at the nurse; (2) Educational Recommendations directed at the competencies required for practice; (3) Organization and Policy Recommendations directed at practice settings and the environment in order to facilitate nurses' practice and (4) Evaluation and monitoring indicators.

It is acknowledged that individual competencies of nurses vary between nurses and across categories of nursing professionals (RNs and RPNs) and are based on knowledge, skills, attitudes and judgement enhanced over time by experience and education. It is expected that individual nurses will perform only those aspects of care for which they have received appropriate education and experience. Both RNs and RPNs should seek consultation in instances where the patient's care needs surpass the individual nurse's ability to act independently.

Although this guideline contains recommendations for Registered Nurses (RNs) and Registered Practical Nurses (RPNs), caring for individuals with chronic obstructive pulmonary disease is an interdisciplinary endeavour. It is acknowledged that effective care depends on a coordinated interdisciplinary approach incorporating ongoing communication between health professionals and patients. Personal preferences and unique needs as well as the personal and environmental resources of each individual patient must always be kept in mind.

Guideline Development Process

In January of 2004, a panel of nurses with expertise in practice, education and research related to chronic obstructive pulmonary disease was established by the RNAO. At the onset, the panel discussed and came to consensus on the scope of the best practice guideline.

A search of the literature for systematic reviews, clinical practice guidelines and relevant articles and websites was conducted. See Appendix A for a detailed outline of the search strategy employed.

The panel identified a total of thirteen clinical practice guidelines related to chronic obstructive pulmonary disease and dyspnea. These guidelines were reviewed according to a set of initial inclusion criteria, which resulted in elimination of four guidelines. The inclusion criteria were:

- Guideline was in English, international in scope.
- Guideline was dated no earlier than 1997.
- Guideline was strictly about the topic area.
- Guideline was evidence-based (e.g., contained references, description of evidence, sources of evidence).
- Guideline was available and accessible for retrieval.

Nine guidelines met these criteria and were critically appraised with the intent of identifying existing guidelines that were current, developed with rigour, evidence-based and which addressed the scope identified by the panel for the best practice guideline. A quality appraisal was conducted on these nine clinical practice guidelines using the *Appraisal of Guidelines for Research and Evaluation Instrument* (AGREE Collaboration, 2001). This process yielded a decision to work primarily with six existing guidelines. These were:

Clinical Epidemiology and Health Service Evaluation Unit (1999). *Evidence based guidelines Royal Melbourne Hospital – Hospital management of an acute exacerbation of chronic obstructive pulmonary disease*. Melbourne: National Health and Medical Research Council.

Institute for Clinical Systems Improvement (2003). Health care guideline: Chronic obstructive pulmonary disease. Institute for Clinical Systems Improvement [Electronic version]. Available: www.icsi.org

McKenzie, D. K., Frith, P. A., Burdon, J. G. W., & Town, I. (2003). The COPDX Plan: Australian and New Zealand guidelines for the management of chronic obstructive pulmonary disease 2003. *Medical Journal of Australia*, 178(6 Suppl), S1-S40.

O'Donnell, D. E., Aaron, S., Bourbeau, J., Hernandez, P., Marciniuk, D., Balter, M. et al. (2003). Canadian Thoracic Society recommendations for management of chronic obstructive pulmonary disease - 2003. *Canadian Respiratory Journal*, 10(Suppl. A), 11A-65A.

Pauwels, R. A., Buist, A. S., Jenkins, C. R., Hurd, S. S., & the GOLD Scientific Committee (2001). Global strategy for the diagnosis, management, and prevention of chronic obstructive pulmonary disease: National Heart, Lung, and Blood Institute and World Health Organization Global Initiative for Chronic Obstructive Lung Disease (GOLD): Executive summary. *Respiratory Care*, 46(8), 798-825.

Veterans Health Administration (2000). VHA/DOD clinical practice guideline for the management of chronic obstructive pulmonary disease. Clinical Practice Guidelines Office of Quality and Performance [Electronic version]. Available: http://www.oqp.med.va.gov/cpg/COPD/COPD_base.htm

It is acknowledged that nursing care of dyspnea in individuals with COPD needs to be studied in a more clearly defined way, and that there are gaps in the research evidence. However, this guideline will enable nurses to apply the best available evidence to clinical practice, and to promote a more appropriate use of healthcare resources.

The panel members divided into subgroups to undergo specific activities using the short-listed guidelines, other literature and additional resources for the purpose of drafting recommendations for nursing interventions. This process yielded a draft set of recommendations. The panel members as a whole reviewed the recommendations, discussed gaps, available evidence, and came to a consensus on a draft guideline.

This draft was submitted to a set of external stakeholders for review and feedback of the content. It was also critiqued using the AGREE instrument. An acknowledgement of these reviewers is provided at the front of this document. Stakeholders represented healthcare consumers, various healthcare disciplines as well as a professional association. External stakeholders were provided with specific questions for comment, as well as the opportunity to give overall feedback and general impressions. The results were compiled and reviewed by the development panel. Discussion and consensus resulted in revision to the draft document prior to publication.

Definition of Terms

An additional Glossary of Terms related to clinical aspects of the guideline is located in Appendix B.

Clinical Practice Guidelines or Best Practice Guidelines: Systematically developed statements (based on best available evidence) to assist practitioner and patient decisions about appropriate healthcare for specific clinical (practice) circumstances (Field & Lohr, 1990).

Consensus: A process for making policy decisions, not a scientific method for creating new knowledge. At its best, consensus development merely makes the best use of available information, be that of scientific data or the collective wisdom of the participants (Black et al., 1999).

Education Recommendations: Statements of educational requirements and educational approaches/strategies for the introduction, implementation and sustainability of the best practice guideline.

Evidence: “An observation, fact or organized body of information offered to support or justify inferences or beliefs in the demonstration of some proposition or matter at issue” (Madjar & Walton, 2001, p.28).

Meta-analysis: The use of statistical methods to summarize the results of independent studies, thus providing more precise estimates of the effects of healthcare than those derived from the individual studies included in a review (Alderson, Green & Higgins, 2004).

Organization & Policy Recommendations: Statements of conditions required for a practice setting that enable the successful implementation of the best practice guideline. The conditions for success are largely the responsibility of the organization, although they may have implications for policy at a broader government or societal level.

Practice Recommendations: Statements of best practice directed at the practice of healthcare professionals that are evidence-based.

Randomized Controlled Trial: For the purposes of this guideline, a study in which subjects are assigned to conditions on the basis of chance, and where at least one of the conditions is a control or comparison condition.

Stakeholder: A stakeholder is an individual, group, or organization with a vested interest in the decisions and actions of organizations that may attempt to influence decisions and actions (Baker et al., 1999). Stakeholders include all individuals or groups who will be directly or indirectly affected by the change or solution to the problem. Stakeholders can be of various types, and can be divided into opponents, supporters, and neutrals (Ontario Public Health Association, 1996).

Systematic Review: Application of a rigorous scientific approach to the preparation of a review article (National Health and Medical Research Council, 1998). Systematic reviews establish where the effects of healthcare are consistent and research results can be applied across populations, settings, and differences in treatment (e.g., dose); and where effects may vary significantly. The use of explicit, systematic methods in reviews limits bias (systematic errors) and reduces chance effects, thus providing more reliable results upon which to draw conclusions and make decisions (Alderson et al., 2004).

Background Context

In Canada 3.9% of Canadians aged 35 years or more (466,812 adults) have probable COPD (Canadian Institute for Health Information, Canadian Lung Association, Health Canada & Statistics Canada, 2001). These figures likely underestimate the true prevalence of COPD because a diagnosis is often not made until the patient is over 55 years of age and has advanced changes in the lung tissue. Furthermore, studies have estimated more than 50% of patients with COPD remain undiagnosed in the community (Calverley & Bellamy, 2000).

Dyspnea and COPD

Similar to pain, often referred to as the fifth vital sign (McCaffrey & Pasero, 1997; 1998; RNAO, 2002a), dyspnea should be understood as the sixth vital sign for individuals living with COPD. Dyspnea, the subjective experience of breathlessness (Gift, 1990; 1993; GOLD Scientific Committee, 2003; 2004), is the most disabling symptom of COPD. As a progressive respiratory disorder, COPD is characterized by progressive airway obstruction precipitating ongoing dyspnea and systemic manifestations including peripheral muscle dysfunction, right heart failure, polycythemia and changes in nutritional status. Although smoking is the major risk factor, much is yet unknown about the causes of COPD (GOLD Scientific Committee, 2003; 2004; O'Donnell et al., 2003).

Acute Exacerbation Episodes of COPD (AECOPD)

People living with COPD experience dyspnea on a daily basis. As the disease progresses individuals have an ever-increasing number of acute exacerbation episodes of their illness (AECOPD), averaging 2-3 per year. These episodes involve a sudden or sustained worsening of dyspnea, cough or sputum production and increased use in maintenance medications. These events are the most frequent reason for hospital visits and mortality. Critically ill individuals with a history of COPD present at healthcare institutions with elevated pulse and respiratory rates, incapacitated by severe dyspnea—the sixth vital sign of individuals with COPD (Gift, Moore & Soeken, 1992; Kinsman, Fernandez, Schocket, Dirks & Covino, 1983; Kinsman, Yaroush, Fernandez, Dirks, Schocket & Fukuhara, 1983; Kroenke, Arrington & Mangelsdorff, 1990; Mahler, Faryniarz, Tomlinson, Colice, Robins, Olmstead et al., 1992).

Key points

- Dyspnea is the sixth vital sign for individuals living with COPD.
- Dyspnea is the most common disabling symptom of COPD.
- Incapacitating dyspnea is the most common presenting symptom of AECOPD.
- People living with COPD experience 2-3 AECOPD per year.

Dyspnea: The Principal Symptom of COPD

Dyspnea is a complex phenomenon, whose genesis from a physiological perspective is associated with a number of elements involving sensory perception, central processing and motor commands; factors associated with respiratory effort or work of breathing, chemoreceptors or chemical factors affecting respiratory drive and mechanoreceptors or sites of dyspno genesis (Killian & Campbell, 1996; Killian & Gandevia, 1996).

In general, there is consensus in the literature concerning the existing physiological research that suggests that the degree of perceived breathlessness is proportional to respiratory effort. That is, the greater the unsuccessful respiratory effort exerted by an individual, the greater the sensation of breathlessness experienced (Campbell & Howell, 1963; El-Manshawi, Killian, Summers & Jones, 1986; Jones, 1992; Jones & Wilson, 1996; Killian, 1985; Killian & Gandevia, 1996; Killian, Gandevia, Summer & Campbell, 1984). Whereas the evidence reviewed suggests a relationship between respiratory effort or work, chemoreceptors and mechanoreceptors, the precise physical mechanism of dyspnea remains unclear. In order to facilitate the development of effective strategies for relief of this distressing symptom in individuals with progressive disease, researchers continue to attempt to understand these mechanisms (Killian, 1985).

Although the affective contribution to a perception of breathlessness has never been denied, the nature of its contribution has been elusive (Guz, 1996). Limited research has been conducted to explain why individuals with apparently comparable lung disease report varying levels of respiratory distress (Traver, 1988). However, the research done in an attempt to understand the psychological aspect of dyspnea does clearly show a relationship between anxiety and levels of dyspnea (Carrieri-Kolman, Douglas, Murray Gormley & Stulbarg, 1993; Gift & Cahill, 1990; Gift, Plaut, & Jacox, 1986). The affective contribution to a perception of more or less severe breathlessness continues to remain enigmatic. Some researchers would suggest that the inconclusiveness of this research implores that these relationships be examined further, and that practitioners should be cautious in their attempt to attribute responsibility for the severity of breathlessness to psychological factors (Bailey, 2004). Indeed perhaps the gap in the understanding of the factors affecting the severity of this perceived symptom is more related to the imperfect understanding of how to objectively measure the experience of breathlessness (Killian, 1985; Killian & Gandevia, 1996).

Key Points

- Dyspnea is a subjective symptom of difficult or uncomfortable breathing.
- Dyspnea must not be confused with changes in rate or depth of respiration that may not produce a sense of breathlessness.
- The affective contribution to a perception of more or less breathlessness remains enigmatic.

Prevalence and Impact of COPD

Since the 1960s there has been an increase in morbidity in women with COPD. There has been an increase in mortality especially in men (Lacasse, Brooks & Goldstein, 1999). In 1999 in Canada, COPD was the fourth leading cause of death in men (5,544 deaths) and the fifth in women (3,974 deaths) (Canadian Institute for Health Information, Canadian Lung Association, Health Canada & Statistics Canada, 2001). From 1988 to 1999, although the rates among men decreased by 7%, mortality rates in women increased by 53% and are still increasing.

Mortality rates also increase rapidly for all individuals over 75 years of age. The change in age structure of the population with an increasing number of people aged over 65 years will result in continued increases in mortality rates for COPD (particularly in women) in the foreseeable future. Furthermore, the estimated mortality rate is a significant underestimation (Ernst, Bourbeau, Rainville, Benayoun & Suissa, 2000). In Canada in 2000/2001, COPD was the seventh most common cause of hospitalization for men and the eighth most common cause of hospitalization for women. Hospitalizations were greater for patients over 65 years of age. Risk of rehospitalization is approximately 40% among patients with COPD (Canadian Institute for Health Information, Canadian Lung Association, Health Canada & Statistics Canada, 2001).

The economic burden for COPD in Canada is enormous. In 1998, \$467 million was spent on hospital care and drugs for COPD. Direct costs (premature mortality, long and short term disability) were estimated at \$1.2 billion, with total cost therefore, estimated at \$1.67 billion. It is suggested that this figure significantly underestimates the true costs because it does not include physician costs or costs related to community-based health services (Canadian Institute for Health Information, Canadian Lung Association, Health Canada & Statistics Canada, 2001).

Key Points

- Mortality rates are increasing for all individuals over 75 years of age.
- In 1999 in Canada, COPD was the fourth leading cause of death in men and the fifth in women.
- Healthcare costs for COPD in Canada represent an enormous economic burden.

Practice Recommendations

Assessment

Recommendation 1.0:

Nurses will acknowledge and accept the patients' self-report of dyspnea. (*Level of Evidence =IV*)

Discussion of Evidence:

Dyspnea is a subjective symptom of difficult or uncomfortable breathing that cannot be measured objectively (Heinzer, Bish & Detwiler, 2003; Killian, 1985; Killian & Gandevia, 1996). It is the disabling symptom of COPD and must not be confused with observed changes in either rate or depth of respiration that may not produce a subjective experience of breathlessness (Altose, 1985; Gift, 1990; 1993; Janson-Bjerklie, Carrieri-Kohlman & Hudes, 1986; Tobin, 1990).

In general, there is consensus in the literature concerning the physiological research that suggests that the degree of perceived breathlessness is proportional to respiratory effort. That is, the greater the unsuccessful respiratory effort exerted by an individual, the greater the sensation of breathlessness experienced (Campbell & Howell, 1963; El-Manshawi et al., 1986; Jones, 1992; Jones & Wilson, 1996). Although cognizant of its significant contribution to the understanding of the phenomena, investigation of this mechanically inappropriate position is not, however, supported as the complete explanation of reported breathlessness in all clinical situations (Adams, 1996; Adams, Lane, Shea, Cockcroft & Guz, 1985; Demediuk, Manning, Lilly, Fencel, Weinberger, Weiss et al., 1992).

Other factors related to biochemical and mechanical stimulation have also been offered as partial explanations of the phenomena. Research into the role of chemoreceptors as co-collaborators in the precipitation of dyspnea has also proven controversial and inconclusive (Burki, 1987; Tobin, 1990). This debate has centred on the independent and combined effect of hypercapnea, hypoxia, and muscle contraction. Earlier work contended that elevations in arterial carbon dioxide did not contribute to sensations of dyspnea (Noble, Eisele, Trenchard & Guz, 1970). Current research asserts, however, that hypercapnea does contribute to the sensation of uncomfortable breathing both independently and in the presence of respiratory effort (Adams et al., 1985; Chonan, Mulholland, Leitner, Altose & Cherniak, 1990; Freedman, Lane & Guz, 1987).

It is believed that the mechanoreceptors in the upper and lower airways, lung parenchyma, and chest wall likewise contribute to the genesis of uncomfortable breathing. A plethora of respiratory research has demonstrated that afferent information from these peripheral sensors does moderate ventilatory patterns and is essential to the perception of dyspnea (Breslin, 1992a; 1992b). Stimulation of the trigeminal nerve for example, can either reduce or promote the sensation of difficult breathing (Schwartzstein, Lahive, Pope, Weinberger & Weiss, 1987; Simon, Basner, Weinberger, Fencel, Weiss & Schwartzstein, 1991). Pursed-lip breathing, hypothesized to alter the transmural pressure gradients and generate afferent sensory messages, also ameliorates the feeling of breathlessness (Breslin, 1992b; O'Donnell, Sani, Anthonisen & Younes, 1988; O'Donnell, Sani, Giesbrecht & Younes, 1987; Sitzman, Kamiya & Johnston, 1983; Thoman, Stoker & Ross, 1966). The research done with heart-lung transplant individuals who possess denervated lungs illustrates the as yet little understood contribution of vagal input in modifying the sensation of breathlessness (Sciurba, Owens, Sanders, Griffith, Hardesty, Paradis et al., 1988). Finally, chest wall receptors also appear to affect the perception of dyspnea. In some research the greater the chest wall movement, the larger the perceived reduction in difficult breathing (Breslin, 1992b; Schwartzstein et al., 1987).

Whereas the evidence reviewed suggests a relationship between respiratory effort or work, chemoreceptors and mechanoreceptors, the precise physical mechanism of dyspnea is still unclear. In order to facilitate the development of effective strategies for relief of this distressing symptom in individuals with progressive disease, researchers continue to attempt to understand these mechanisms.

Recommendation 1.1:

All individuals identified as having dyspnea related to COPD will be assessed appropriately (See Figure 1 – COPD Decision Tree). Respiratory assessment should include:

- **Level of dyspnea**
 - Present level of dyspnea
 - Present dyspnea should be measured using a quantitative scale such as a visual analogue (*Appendix C*) or numeric rating scale (*Appendix D*)

- **Usual level of dyspnea**
 - Usual dyspnea should be measured using a quantitative scale such as the Medical Research Council (MRC) Dyspnea Scale (*Appendix E*)

- **Vital signs**
- **Pulse oximetry**
- **Chest auscultation**
- **Chest wall movement and shape/abnormalities**
- **Presence of peripheral edema**
- **Accessory muscle use**
- **Presence of cough and/or sputum**
- **Ability to complete a full sentence**
- **Level of consciousness** (*Level of Evidence =IV*)

Discussion of Evidence:

Dyspnea is a subjective symptom of physiological distress (Heinzer et al., 2003). A number of tools are available to measure dyspnea in the clinical and research settings (see Appendix F: Summary of Dyspnea Assessment Tools). Two tools used by nurses to measure present dyspnea (Gift & Narsavage, 1998), or the dyspnea that the patient is experiencing at the moment are the visual analogue or numerical rating scale (see Appendix C & D). These tools are useful to assess the effectiveness of an intervention such as drug therapy, position change, or relaxation exercises. However, they do not help explain what function the patient is capable of, or what activities he is avoiding to prevent dyspnea (American Thoracic Society, 1999).

Assessing the patient's usual dyspnea can be done with the Medical Research Council Scale (MRC) (see Appendix E), a simple and valid method of categorizing patients with COPD in terms of their disability (Bestall, Paul, Garrod, Garnham, Jones & Wedzicha, 1999) or functional ability (O'Donnell et al., 2003). MRC is easy to administer and requires very little time. While it is not useful for capturing rapid change induced by a treatment or exercise, it is useful for capturing prolonged changes in dyspnea status.

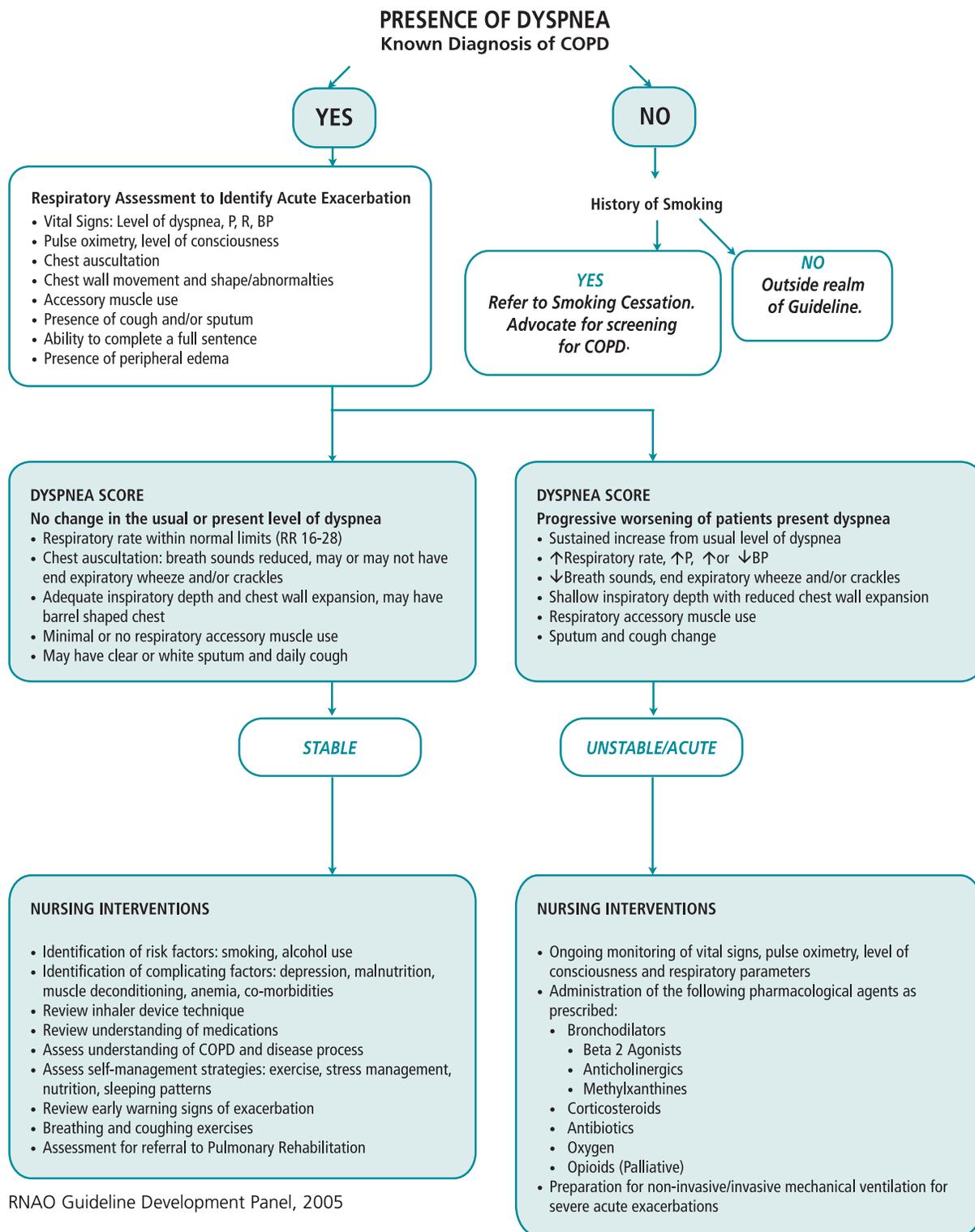
Although there may be changes in the pulse rate, blood pressure and respiratory rate of an individual living with COPD, these changes are not specific to COPD except during acute exacerbation events or end-stage disease (GOLD Scientific Committee, 2003; 2004). Pulse oximetry during periods of stable illness are usually maintained at < 90%. Physical examination, including chest auscultation, chest wall movement and shape/abnormalities is also rarely helpful in determining the level of disease or distress. The presence of peripheral edema may be an indication of cardiovascular involvement as the disease advances (Weitzenblum, 2003).

During AECOPD, individuals experience incapacitating dyspnea caused by a severe increase in the work of breathing and may exhibit increased use of accessory muscles. They also may experience the following alterations in their vital signs: a respiratory rate > 30/min, a diastolic pressure < 60 mmHg, a systolic blood pressure < 90 mmHg (Clinical Epidemiology and Health Service Evaluation Unit, 1999; O'Donnell et al., 2003), an elevated temperature (Henker, Kramer & Rogers, 1997), and a pulse oximetry < 90% on room air (Clinical Epidemiology and Health Service Evaluation Unit, 1999; O'Donnell et al., 2003). These individuals may also present with changes in the volume, colour, and viscosity of the sputum (Clinical Epidemiology and Health Service Evaluation Unit, 1999; O'Donnell et al., 2003). As the dyspnea worsens individuals are less able to complete a full sentence and experience alterations in the level of consciousness.

For a sample of a COPD assessment form see Appendix G.



Figure 1: COPD Decision Tree



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Recommendation 1.2:

Nurses will be able to identify stable and unstable dyspnea, and acute respiratory failure.

(Level of Evidence =IV)

(Refer to Table 1 for descriptors of disease severity as related to progressive clinical symptom.)

Discussion of Evidence:

Early recognition of exacerbation is key to the prevention of frequent hospitalization and possible acute respiratory failure (O'Donnell et al, 2003). Nurses caring for patients dealing with COPD require a strong knowledge base and understanding of the symptoms reflective of acute exacerbation events. Developing a process for review and consistent approaches to treatment across settings will also strengthen a nurse's ability to teach and reinforce patient's disease self-management strategies. Table 1 provides an overview of the key symptoms associated with the various levels of severity as compared to episodes of unstable and acute exacerbations.



Table 1: COPD Severity and Symptom Descriptors

Disease Severity	Pulmonary Function	Changes in Level of Activity (O'Donnell et al., 2003)	Stable Clinical Symptoms	Unstable/Acute Clinical Symptoms	Evidence of Acute Respiratory Failure
Mild (stage I)	FEV ₁ 60 – 79% predicted FEV ₁ /FVC < 70%	Dyspnea from COPD when hurrying on the level or walking up a slight hill *DYSPNEA SCORE (MRC 2)	1. Respiratory rate within normal limits (RR 16-28) 2. Chest auscultation: breath sounds reduced, may or may not have end expiratory wheeze and/or crackles. 3. Adequate inspiratory depth and chest wall expansion, may have barrel shaped chest. 4. Minimal or no respiratory accessory muscle use. 5. May have clear or white sputum. 6. Daily cough. 7. May not have complaints of fatigue.	Complaints of increasing level of dyspnea 1. Respiratory rate may or may not be within normal limits. 2. Chest auscultation: breath sounds reduced, may or may not have end expiratory wheeze and/or crackles. 3. May have shallow inspiratory depth with reduced chest wall expansion. 4. Respiratory accessory muscle use. 5. Sputum change: yellow/green/purulent/thick and/or increased amount. 6. Increased cough severity. 7. Progressive fatigue. 8. Potential presence of peripheral and/or central cyanosis.	Pulmonary: ↑ accessory muscle use, ↑ complaints of worsening dyspnea, ↑ complaints of impending doom. PaO₂ < 60 mmHg on room air PaCO₂ > 50 mmHg Arterial pH < 7.28 SpO₂ < 88 % [Although pulse oximetry is a valuable tool in many disease processes, it is not a reliable indicator of dypnea severity in individuals with COPD.] Neuro: Restlessness, agitation, headache, disorientation, seizures, muscle twitching, decreased level of consciousness. CVS: ↑ heart rate, hypertension (early sign), hypotension (late sign), chest pain, dysrhythmias. Renal: ↓ urinary output, peripheral edema. GI: ↓ bowel sounds, nausea and vomiting, abdominal distention, bleeding. Skin: cool, clammy, pale, ↓ capillary refill.
Moderate (stage II)	FEV ₁ 40 – 59% predicted FEV ₁ /FVC < 70%	Dyspnea from COPD causing patient to stop after walking about 100 m (or after a few minutes) on the level *DYSPNEA SCORE (MRC 3-4)	1. Respiratory rate above normal limits. 2. Chest auscultation: breath sounds reduced, may or may not have end expiratory wheeze and/or crackles. 3. Adequate chest wall expansion. 4. Minimal or moderate accessory muscle use. 5. May have clear or white sputum. 6. Daily cough. 7. Fatigue often present.		
Severe (stage III)	FEV ₁ < 40% predicted FEV ₁ /FVC < 70%	Dyspnea from COPD resulting in the patient too breathless to leave the house, or breathlessness after undressing, or the presence of chronic respiratory failure or clinical signs of right heart failure *DYSPNEA SCORE (MRC 5)	1. Respiratory rate outside normal limits. 2. Chest auscultation: air entry distant, wheeze and/or crackles. 3. Adequate chest wall expansion. 4. Moderate accessory muscle use. 5. May have clear or white sputum. 6. Daily cough. 7. Fatigue usually present.		

* Perception of dyspnea is individualized and may vary from the usual scores above.

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Recommendation 1.3:

Every adult with dyspnea who has a history of smoking and is over the age of 40 should be screened to identify those most likely to be affected by COPD. As part of the basic dyspnea assessment, nurses should ask every patient:

- Do you have progressive activity-related shortness of breath?
- Do you have a persistent cough and sputum production?
- Do you experience frequent respiratory tract infections? (*Level of Evidence =IV*)

Recommendation 1.4:

For patients who have a history of smoking and are over the age of 40, nurses should advocate for spirometric testing to establish early diagnosis in at risk individuals. (*Level of Evidence =IV*)

Discussion of Evidence:

Most individuals with COPD are not diagnosed until the disease is well advanced. Despite the lack of evidence supporting mass screening for COPD among asymptomatic smokers, the Canadian Thoracic Society (O'Donnell et al., 2003) does recommend performing targeted spirometric testing to establish early diagnosis in at risk individuals. The above clinical information will help identify those individuals considered potentially at risk for the development of COPD related to smoking. Nurses are encouraged to advocate for early screening for those patients who have a history of smoking and are over the age of 40 (DeJong & Veltman, 2004).

Enright and Crapo (2000) in a recent review question the number of false-positive and false-negative rates of office spirometry for early recognition and diagnosis of COPD in cigarette smokers. A consensus statement from the National Lung Health Education Program recommends the development, validation, and implementation of office spirometry for the purpose of early diagnosis in 'at risk' individuals in the primary care setting (Ferguson, Enright, Buist & Higgins, 2000).



COPD Dyspnea Interventions/Education

Recommendation 2.0:

Nurses will be able to implement appropriate nursing interventions for all levels of dyspnea including acute episodes of respiratory distress:

- Acknowledgement and acceptance of patients' self-report of present level of dyspnea
- Medications
- Controlled oxygen therapy
- Secretion clearance strategies (*Appendix H*)
- Non-invasive and invasive ventilation modalities
- Energy conserving strategies (*Appendix I*)
- Relaxation techniques (*Appendix J*)
- Nutritional strategies
- Breathing retraining strategies (*Appendix J*)

(Level of Evidence =IV)

Discussion of Evidence:

Acknowledgement and Acceptance of Patients' Self-Report of Present Level of Dyspnea

Dyspnea by definition has a subjective, sensory component. Nurses need to acknowledge and accept patients' self-report of present level of dyspnea. In a qualitative phenomenological study by Devito (1990), patients who were interviewed felt the need to hear nurses acknowledge that their dyspnea during a flare-up was acute, required immediate attention, and was obviously different from the shortness of breath they tolerated on a daily basis. Acknowledgement and acceptance of this pattern would validate the legitimacy of the dyspnea.

Medications – See discussion of evidence in recommendation 3.0.

Controlled Oxygen Therapy – See discussion of evidence in recommendation 4.0.

Secretion Clearance Strategies

There are abundant anecdotal reports that controlled coughing or forced expiration enhance secretion clearance (Van der Schans, 1997). Jones and Rowe (2004) conducted a systematic review and found that chest physiotherapy was effective in helping to clear sputum in chronic obstructive pulmonary disease and in bronchiectasis. Current practice involves the teaching of sputum clearance strategies in rehabilitation and COPD education programs, and expert nurses in the field believe that they help (Van der Schans, 1997).

See Appendix H for Secretion Clearance Technique – How to Teach Secretion Clearance.

Non-invasive and Invasive Ventilation Modalities

Non-invasive positive pressure ventilation (NIPPV) (e.g., bi-level positive airway pressure) is indicated for the treatment of both acute hypercapneic and hypoxemic respiratory failure. In patients with COPD, respiratory muscle fatigue with increased airway resistance or decreased compliance often leads to respiratory distress and failure. Bi-level positive airway pressure via nasal oral, oronasal, full and total face mask provides alternating levels of inspiratory pressure to keep the airway open as a patient breathes in, and expiratory pressure to reduce the work of exhalation.

A meta-analysis of seven randomized trials showed that NIPPV is associated with lower rates of death and endotracheal intubation, in patients with acute respiratory failure compared with usual practice, with the greatest benefit in patients with exacerbation of acute COPD (Keenan, Kernerman, Cook, Martin, McCormack & Sibbald, 1997).

Invasive ventilation is used for hypercapneic failure in those patients who do not tolerate or benefit from non-invasive pressure ventilation or cannot sustain NIPPV effort. Further discussion of invasive ventilation is beyond the scope of this guideline.

Energy Conserving Strategies

Some work has been done to address the importance of pacing activities to conserve energy for individuals living with COPD. Carrieri, Janson-Bjerklie, & Jacobs (1984) report on two studies by Fagerhaugh (1973) and Barstow (1974), in which patients describe the strategies they use to cope with dyspnea resulting from emphysema. Both authors describe careful planning to minimize energy expenditure.

Pacing was identified as one of the main strategies to conserve energy in several qualitative studies (Brown, Carrieri, Janson-Bjerklie & Dodd, 1986; Carrieri & Janson-Bjerklie, 1986; Leidy & Haase, 1996; Roberts, Thorne & Pearson, 1993); however, little quantitative research was found related to this topic. One randomized controlled trial by Bredin, Corner, Krishnasamy, Plant, Bailey and A'Hern (1999) demonstrated significant improvement in patients with breathlessness due to lung cancer when they were taught a range of strategies including activity pacing. However, there is no way of identifying which strategy caused the improvement.

Breslin (1992a) acknowledges that nurses commonly teach patients to pace the performance of activities of daily living in relation to their respiratory cycle. She contends, however, that there are breath-pacing differences between activities involving lower body motor activity such as walking and upper body arm activities such as eating, dressing and teeth and hair brushing. Breslin (1988) suggests that, to minimize dyspnea, individuals living with severe breathlessness should be encouraged to perform leg exercise during the expiratory phase of respiration, however, perform unsupported arm activities during the inspiratory phase of the cycle. According to Breslin (1992a), doing lower body activity during the exhalation phase of respiration is thought to reduce the respiratory rate and prolong the duration of exhalation leading to a decrease in dyspnea. Although the mechanism of reduced dyspnea with alternate respiratory pacing for arm activity has not been reported, Breslin states that individuals do report less breathlessness with the alternate pacing, suggesting that the chest wall muscles recruited by individuals during inspiration are able to rest during the expiratory phase.

A rollator device was found to reduce dyspnea and improve functional exercise capacity in 40 patients with COPD in one repeated-measures randomized crossover design study (Solway, Brooks, Lau & Goldstein, 2002). A randomized parallel groups trial with 110 patients found that physical disability was reduced with use of a wheeled walker (Yohannes & Connolly, 2003).

See Appendix I for Energy Conservation Tips.

Relaxation Techniques

The American Thoracic Society consensus statement (1999) concludes that relaxation training may improve dyspnea in the short term, but has not been shown to have long-term effects. In a qualitative study, 25% of the patients reported using relaxation techniques to control dyspnea (Carrieri & Janson-Bjerklie, 1986).

Relaxation techniques often taught are progressive muscular relaxation, positive thinking and visualization, use of music, yoga, and humour.

Progressive Muscular Relaxation. The Institute for Clinical Systems Improvement guideline (2003) stated that progressive muscle relaxation has been shown to reduce psychological distress and dyspnea. Two randomized controlled trials looked at progressive muscle relaxation to reduce the anxiety associated with dyspnea in patients with COPD (Gift et al., 1992; Renfroe, 1988). Both studies demonstrated an improvement in dyspnea scores in the relaxation group.

Positive Thinking and Visualization. In one qualitative study, 13% of the subjects used positive thinking, focusing on a desire to live, or they ignored their shortness of breath and tried not to worry about it (Carrieri & Janson-Bjerklie, 1986). There is little evidence to support this strategy.

Music. The American Thoracic Society consensus statement on dyspnea (1999) states that improvement in dyspnea and anxiety has been shown following distraction interventions such as music during exercise.

Yoga. There is one study with 11 patients that supports training in yoga breathing exercises and postures to improve dyspnea (Tandon, 1978).

Positioning. Positioning is a strategy described by patients to help them cope with dyspnea (Carrieri & Janson-Bjerklie, 1986; Roberts et al., 1993). The American Thoracic Society consensus statement (1999) concludes that the leaning forward position has been reported to improve overall inspiratory muscle strength (O'Neill & McCarthy, 1983), increase diaphragm recruitment, reduce participation of neck and upper costal muscles in respiration, and decrease abdominal paradoxical breathing, as well as reduce dyspnea in COPD (Barach, 1974; Barach & Beck, 1954; Sharp, Drutz, Moisan, Foster & Machnach, 1980).

Use of Fresh Air or Fan. Cold facial stimulation has been shown to reduce induced breathlessness in normal subjects (Schwartzstein et al., 1987). The best support for this strategy comes from qualitative studies in which patients say that it helps (Carrieri & Janson-Bjerklie, 1986; Roberts et al., 1993).

See Appendix J for instructions on some of the relaxation techniques.

Nutritional Strategies

Nurses should consider and understand the impact of dyspnea, dysphagia, dyspepsia, depression, anxiety, physical limitations, social/financial considerations, food allergies, and drug/alcohol consumption on nutritional status for individuals with COPD (Bourbeau, Nault & Borycki, 2002). The role of nutritional education is an important aspect of health promotion for individuals with COPD.

An individual with COPD has increased energy expenditure to breathe which results in increased caloric intake needs (Branson & Hurst, 1988). Individuals with COPD often experience an imbalance between energy intake and expenditure despite a normal diet. This may be a reflection of increased catabolism and muscle proteolysis involved in the wasting process (Bourbeau et al., 2002). The use of systemic corticosteroid therapy during acute exacerbations may also contribute to depletion of fat free mass (Bourbeau et al., 2002).

According to Demling and De Santi (2002), complications of involuntary weight loss and protein energy malnutrition are: increased disability (decreased activity, discomfort, decreased appetite, progressing protein energy malnutrition); impaired lung function (acute and chronic); weakness and increased infection.

Protein depletion is a common feature of COPD and may be present in an individual who maybe of normal weight, under weight or obese. This depletion often results in a reduction of muscle function. The role of nutritional screening by a registered dietitian is crucial for appropriate intervention. Nutritional treatment of protein energy malnutrition associated with COPD may positively affect body composition as well as muscle strength and respiratory function (Cederholm, 2002).

A low body mass index (BMI) (weight in kilogram [kg] divided by the square of height in meters [m]) has been associated with an increased rate of death (Schols, Slangen, Volovics & Wouters, 1998). A BMI below 21 has been associated with an increased risk of death (Landbo, Prescott, Lange, Vestbo & Almdal, 1999). Detecting sudden weight changes in the earlier stages and intervening appropriately is critical.

Years of corticosteroid therapy may lead to osteoporosis. Corticosteroids may increase Vitamin D metabolism, which in turn may accelerate bone loss (American Association of Cardiovascular and Pulmonary Rehabilitation, 1993). Individuals with COPD need to understand the importance of calcium and vitamin D in their diet.

Key Points

- Individuals with COPD have increased energy expenditure related to the increased work of breathing, increased oxygen consumption, inefficient gas exchange, and increased dead space ventilation (Braun, Dixon, Keim, Luby, Anderegg & Shrago, 1984). They can expend 30-50% more energy on breathing when compared to the average individual (Laaban, 1991).
- The need to promote aggressive nutritional support is critical as fat free mass depletion may occur as a result of repeated exacerbations, dyspnea and systemic inflammation. Hypoxemia may also impair intestinal absorption of nutrients. Protein depletion with or without weight loss is often a feature of COPD that creates a reduction of muscle function (Demling & De Santi, 2002).
- Years of corticosteroid therapy may lead to osteoporosis. Corticosteroids can increase Vitamin D metabolism that may accelerate bone loss (American Association of Cardiovascular and Pulmonary Rehabilitation, 1993). It is important that the nutritional intake of calcium and vitamin D be included when educating individuals with COPD.
- A low body mass index has been associated with an increased rate of death for individuals with COPD. Maintenance of a healthy body weight and healthy eating habits are warranted.
- Referral to a dietitian is warranted, as individuals with COPD require appropriate nutritional screening and intervention.

Assessment of nutritional status should include:

- Recording of weight and height
- Calculation of body mass index (BMI) (See Appendix K)
- Asking about eating habits and behaviours (consider attitudes and beliefs about nutrition, food and health)
- Inspection for ankle edema

Interventions should include the use of Canada's Food Guide to address healthy eating habits. Potential problems that individuals with COPD may encounter should be considered and addressed. See Table 2 for symptoms and potential nutritional solutions.

Table 2: Symptoms and Potential Nutrition Solutions

Symptoms	Solutions
Dyspnea and fatigue	<ul style="list-style-type: none"> ■ Consider easy meal preparation. ■ Prepare meals utilizing simple recipes in bulk where single portions can be frozen. ■ Stocking up on prepared foods may also be an alternate solution. ■ Arrangements of home delivered meals may also be a possibility. ■ Encourage resting before eating and cough techniques prior to meals (if necessary). ■ Encourage the individuals to eat slowly and utilize pursed-lip breathing. ■ Consider use of oxygen (if indicated) at meal times.
Dysphagia/Dental problems	<ul style="list-style-type: none"> ■ Promote good dental hygiene. ■ Assess denture fit and ensure adequate oral rinsing. ■ Encourage high calorie, dense foods in a soft diet. ■ Consider liquid nutritional supplementation.
Oral thrush due to improper inhaled corticosteroid use	<ul style="list-style-type: none"> ■ Assess oral cavity. ■ Promote good dental hygiene. ■ Ensure appropriate medical follow up. ■ Ensure adequate rinsing of mouth post-inhaled corticosteroid. <p>Consider liquid nutritional supplementation if individual is unable to eat.</p>
Decreased appetite related to impact of disease, depression and/or social isolation	<ul style="list-style-type: none"> ■ Assess nutritional intake and eating habits. ■ Consider alternative eating environments (e.g., church-based or community-based volunteer programs) ■ Promote easy meal preparation alternatives (e.g., meals on wheels)
Dyspepsia/Aerophagia	<ul style="list-style-type: none"> ■ Encourage individuals to eat slowly and chew food well. Smaller meals (5-6 small meals/day) are ideal for encouraging adequate nutritional intake. ■ Avoid drinking while eating or carbonated beverages to prevent gas swallowing. ■ Gas producing foods such as broccoli, cabbage, cauliflower and onions should be avoided.
Early satiety during meals	<ul style="list-style-type: none"> ■ Avoid drinking liquids one hour prior to meal time. ■ Cold meals instead of hot meals, as hot meals create a sense of fullness. ■ Consider liquid nutritional supplementation, to compensate for inadequate nutritional intake.
Constipation	<ul style="list-style-type: none"> ■ Recommend high fibre foods and drinking of fluids. ■ Promote mobility by encouraging exercise/activity as tolerated.

RNAO Guideline Development Panel, 2005

Breathing Retraining Strategies to Take Control or Lessen Dyspnea Associated with COPD

The goal of breathing retraining is to decrease dyspnea and help the individual regain control of their breathing, particularly in stressful situations. Supporting evidence is mixed. The American Thoracic Society (1999) comments that many patients adopt the slower, deeper breathing techniques during their retraining but return to their spontaneous fast, shallow breathing pattern when unobserved, which likely represents an optimal compensatory strategy for them. Sassi-Dambros, Eakin, Ries & Kaplan (1995) concluded that a dyspnea management strategy without structured exercise training was not sufficient to produce significant improvements in dyspnea. The types of breathing techniques commonly taught are pursed-lip, diaphragmatic and lateral–costal.

Pursed-lips breathing (PLB)

Qualitative studies have found that patients use pursed-lip breathing spontaneously as an effective strategy for the relief of dyspnea (Bianchi, Gigliotti, Romagnoli, Lanini, Castellani, Grazzini, et al., 2004; Brown et al., 1986). Pursed-lip breathing involves active expiration through a resistance that is created by constricting or pursing the lips (see instructions in Appendix J). Expiration is prolonged, and tidal volume generally increases with modest transient improvements in gas exchange (Tiep, Burn, Kao, Madison, & Herrera, 1986). Possible dyspnea-relieving factors during PLB include altered breathing pattern (slower and deeper) with improved ventilation-perfusion relationships, improved arterial oxygen desaturation and CO₂ elimination, altered pattern of ventilatory muscle recruitment, which may optimize diaphragmatic length and assist inspiration, and reduced lung hyperinflation as a result of reduced breathing frequency and prolongation of expiratory time (Breslin, 1992b). Although no consensus exists about the precise neurophysiologic mechanisms of dyspnea relief during PLB, clinical experience has shown that the technique is undoubtedly beneficial in some patients and is usually a part of most rehabilitation programs.

Diaphragmatic Breathing

The guidelines from the Institute for Clinical Systems Improvement (2003) list diaphragmatic breathing as part of the education to be done during pulmonary rehabilitation. In a scientific review, Cahalin, Braga, Matsuo, & Hernandez (2002) suggest that those who have some movement of the diaphragm may benefit, while those without diaphragmatic movement may be poor candidates for instruction. Diaphragmatic breathing is often included in recommendations of strategies to teach patients with dyspnea (Froza, 1998).

Lateral-Costal Breathing

Limited research has been done on lateral-costal breathing. One randomized controlled trial (RCT) with 14 patients found that inspiratory muscle training improved both strength and endurance in inspiratory muscles (Ramirez-Sarmiento, Orozco-Levi, Guell, Barreiro, Hernandez, Mota, et al., 2002). The American College of Chest Physicians and the American Association of Cardiovascular and Pulmonary Rehabilitation panel of experts concluded that the scientific evidence for ventilatory muscle training was not sufficiently strong to support its use (Collins, Langbein, Fehr, & Maloney, 2001).

See Appendix J for instructions on breathing and relaxation techniques.

Recommendation 2.1:

Nurses must remain with patients during episodes of acute respiratory distress. *(Level of Evidence =IV)*

Discussion of Evidence:

The severity of disability relates to respiratory insufficiency and this can cause fear and anxiety for the patient (Narsavage, 1997). Devito (1990) conducted a qualitative phenomenological study to determine the patients' experiences with dyspneic episodes during hospitalizations for an acute phase of COPD. Themes of fear, helplessness, loss of vitality, preoccupation and legitimacy surfaced from the patients' recollections of their lived experiences (Devito, 1990). In 2003, the qualitative study by Heinzer and colleagues used the five themes in Devito's model to focus on the emotional aspects of acute experience of dyspnea in patients diagnosed with COPD and explored nursing activities that eased the intensity of the symptoms. Heinzer et al. (2003) found that patients reiterated the importance of having someone with them to anticipate their needs and assist them with activities. Responses included "attending to needs right away", "nurse breathed with me", "sitting up", "felt better when someone was in the room", "nurse took time to find out what I need", "nurse kept me relaxed", "making me feel comfortable and safe", and "having someone to hold on to". Presence is one of the themes that were discovered in this study.

A sense of control could help patients with COPD cope with fear, anxiety and dyspnea. Nurses' presence during episodes of acute respiratory distress may assist patients in achieving that sense of control.

Recommendation 2.2:

Smoking cessation strategies should be instituted for patients who smoke:

- Refer to RNAO (2003a) guideline, *Integrating Smoking Cessation into Daily Nursing Practice*.
- Use of nicotine replacement and other smoking cessation modalities during hospitalization for acute exacerbation. *(Level of Evidence =IV)*

Discussion of Evidence:

According to the Canadian Thoracic Society recommendations for management of COPD (O'Donnell et al., 2003), cigarette smoking is the single most important cause of COPD, and the greater the exposure, the greater the risk of developing airway obstruction. The most important preventive measure is encouraging patients to stop smoking (Clinical Epidemiology and Health Service Evaluation Unit, 1999; GOLD Scientific Committee, 2003; 2004).

The RNAO (2003a) guideline, *Integrating Smoking Cessation into Daily Nursing Practice* (available at www.rnao.org/bestpractices), provides recommendations to assist nurses and other healthcare professionals in promoting smoking cessation through minimal and intensive smoking cessation interventions.

In a systematic review, Rigotti, Munafo, Murphy and Stead (2004) found that high intensity behavioural interventions that include at least one month follow-up contact are effective in promoting smoking cessation in hospitalized patients. They suggest that their findings were compatible with research in other settings. They also contend that the use of a nicotine replacement patch be used during hospitalization for acute exacerbation of COPD.

Medications

Recommendation 3.0:

Nurses should provide appropriate administration of the following pharmacological agents as prescribed: (See Appendix L – COPD Medications)

- **Bronchodilators** (*Level of Evidence = 1b*)
 - Beta 2 Agonists
 - Anticholinergics
 - Methylxanthines
- **Oxygen** (*Level of Evidence = 1b*)
- **Corticosteroids** (*Level of Evidence = 1b*)
- **Antibiotics** (*Level of Evidence = 1a*)
- **Psychotropics** (*Level of Evidence = IV*)
- **Opioids** (*Level of Evidence = IV*)

Discussion of Evidence:

Nurses must do an assessment of patient's medical history and medication regimen of both prescribed and over the counter medication prior to the administration of medications related to COPD treatment.

Bronchodilators

Bronchodilators are currently the mainstay of pharmacological therapy for COPD and can be inhaled or taken orally. There are three major classes: anticholinergics, beta 2 agonists and methylxanthines (oral). All three classes include drugs that are short-acting and long-acting (O'Donnell et al., 2003). Bronchodilators are used primarily to relieve symptoms associated with COPD as they provide relief of bronchoconstriction. Bronchodilators can be combined with one another in one formulation (salbutamol and ipratropium bromide combination products) and can be combined with ICS (formoterol and budesonide, and salmeterol and fluticasone combination products). The ideal bronchodilator would be well tolerated by the patient and demonstrate sustained improvement in spirometry, lung hyperinflation, exercise performance, dyspnea, and quality of life in all patients with COPD (O'Donnell et al., 2003). The use of a metered dose inhaler (MDI) with spacer is preferred over the use of a nebulizer for all patients of all ages at all levels of severity (Coakley, 2001; Wright, Brocklebank & Ram, 2002).

Oxygen – See discussion of evidence in recommendation 4.0

Corticosteroids

Corticosteroids are recommended for use in AECOPD (O'Donnell et al., 2003). The Canadian Thoracic Society guidelines (O'Donnell et al., 2003) suggest that there has been no long-term randomized controlled trial examining the effects of oral corticosteroids alone, however, several short-term trials have been reported over the last 50 years. The long-term treatment of COPD with oral corticosteroids is not recommended due to lack of evidence regarding its benefit and the high risk of adverse systemic effects such as osteoporosis, muscle weakness, hypertension, dermal thinning and cataract formation.

Antibiotics

Ram, Joppi and Barnes (2004), in a systematic review, indicate that acute bacterial exacerbations of COPD are common, costly and difficult to manage. A number of researchers link AECOPD to bacterial infection by pathogens such as *Streptococcus pneumoniae*, *Haemophilus influenzae*, *Pseudomonas aeruginosa* and *M. catarrhalis*. These bacteria may be associated with increased sputum volume and purulence (Blanchard, 2002; Eller, Ede, Schaberg, Niederman, Mauch & Lode, 1998; Grossman, 1998; Murphy, Sethi & Niederman, 2000; Ram et al., 2004). However, the use of antibiotics is often prescribed to alleviate and to treat the cough and increase purulent sputum production that leads to increase breathlessness (Calverley & Walker, 2003). In these instances, the use of antibiotics is controversial (Adams, Melo, Luther, & Anzueto, 2000; Anthonisen, Manfreda, Warren, Hershfield, Harding, & Nelson, 1987; Dewan, Rafique, Kanwar, Satpathy, Ryschon, Tillotson, et al., 2000; Grossman, 1997; 1998; Murphy et al., 2000; Nicotra, Rivera & Awe, 1982; Niederman, 1997; Ram et al., 2004; Wilson, 1998). Ram and colleagues (2004) suggest there is increased recognition that exacerbations may be due to viral infections of the upper respiratory tract or may be non-infective, so that antibiotic treatment is not always warranted.

Anthonisen et al. (1987) found statistically significant advantages of antibiotic therapy for exacerbations compared to placebo and suggest that antibiotic use is favourable where increased dyspnea, sputum production or increased purulence of sputum is present in more severe exacerbations. A meta-analysis by Saint, Bent, Vittinghoff & Grady (1995) attempted to estimate the effectiveness of antibiotics in treating AECOPD and demonstrated benefits from antibiotic therapy. Adams et al. (2000) assessed predictive factors of relapse for patients with AECOPD and the findings suggest that patients treated with antibiotics had significantly lower relapse rates than those who did not receive antibiotics.

Psychotropic Drugs

Ripamonti (1999) suggests that although benzodiazepines are commonly used in the symptomatic treatment of cancer-related dyspnea, no clinical controlled trials have been performed in cancer patients. Buspirone, a nonbenzodiazepine anxiolytic and a serotonin agonist has been demonstrated to be effective in relieving dyspnea in patients with anxiety disorders and obstructive lung disease when given at doses of 15-45 mg/day (Craven & Sutherland, 1991). Ripamonti (1999) suggests that chlorpromazine (Chlorpromanyl) is significantly more effective than placebo in reducing dyspnea in patients with COPD.

Opioids

Currently available evidence does not support the clinical use of nebulized opioids; however, some clinicians utilize opioids to treat the symptom of dyspnea in end-stage COPD. Controlled clinical trials on the symptomatic effect of nebulized opioids in COPD have been carried out and the use is controversial (Ripamonti, 1999; Zebraski, Kochenasti & Raffa, 2000). Moreover, Zebraski et al. (2000) suggest that the effect of nebulized morphine sulfate in COPD patients has not always been robust nor always reproducible.

Foral, Malesker, Huerta and Hilleman (2004) examined the literature related to the use of nebulized opioids in COPD. They suggest that the evidence in the literature that supports the use of nebulized opioids is lacking and studies varied considerably in dose, opioid used, administration schedule and methodology. Moreover, they mentioned that as stated in the the *Global Initiative for Lung Disease* guidelines, opioid use is contraindicated in COPD management due to the potential respiratory depression and worsening hypercapnia.

Recommendation 3.1:

Nurses will assess patients' inhaler device technique to ensure accurate use. Nurses will coach patients with sub-optimal technique in proper inhaler device technique. *(Level of Evidence =1a)*

Discussion of Evidence:

Coakley (2001) and Wright et al. (2002) suggest that the use of inhalers is widespread for conditions such as COPD and yet many people have difficulties in mastering correct inhaler technique. The inhaled route is the preferred route as it minimizes systemic availability and therefore minimizes side effects (Coakley, 2001; Wright et al., 2002). Elderly people have specific problems with inhaler use and require interventions aimed at improving their inhaler technique and minimizing waste of inhaled medication and therefore lack of therapeutic effect. A systematic review of the literature showed that only 46-59% of patients used their inhalers correctly (Cochrane, Bala, Downs, Mauskopf & Ben Joseph, 2000). Knowing this, nurses must be able to demonstrate correct inhaler technique, assess and optimize patient's technique (Coakley, 2001; Wright et al., 2002). Frequent assessment of inhaler technique needs to become a regular activity of health promotion for all patients using these devices (Coakley, 2001).

See Appendix M for a discussion of device technique.

Recommendation 3.2:

Nurses will be able to discuss the main categories of medications with their patients including:

- Trade and generic names
- Indications
- Doses
- Side effects
- Mode of administration
- Pharmacokinetics
- Nursing considerations

(Level of Evidence =IV)

Discussion of Evidence:

Education of individuals with COPD is aimed primarily at improving their coping skills to help them to control their disease and live functional lives. It also leads to an increased understanding of the physical and psychological changes produced by chronic illness and may lead to fewer admissions to hospitals as well as reduced time in hospital (Clinical Epidemiology & Health Service Evaluation Unit, 1999). Educating the patient about their medication is an important part of ensuring safe medication use (Cohen, 1999). Patients who know what their medication is for, how it should be taken, how it works, and what it looks like are in the position to reduce the likelihood of medication error. Patient education and counselling about medications should happen at all points of care (Cohen, 1999).

See Appendix L for a list of COPD Medications.

Vaccination

Recommendation 3.3:

Annual influenza vaccination should be recommended for individuals who do not have a contraindication. (Level of Evidence =1a)

Discussion of Evidence:

The Canadian Thoracic Society guidelines (O'Donnell et al., 2003) suggest that patients with COPD who are infected with influenza have a significant risk of requiring hospitalization. An acute exacerbation of COPD may be caused by bacterial infection and may be associated with increased volume and purulence of the sputum (Blanchard, 2002; Eller et al., 1998; Grossman, 1998; Murphy et al., 2000; Ram et al., 2004). Yohannes and Hardy (2003) suggest that studies of the efficacy of influenza vaccination on varying severities of COPD are lacking, however, there is a 70% reduction in mortality from influenza following vaccination. Individuals who experience recurrent acute exacerbation who are vaccinated in the autumn will experience a reduced number of acute exacerbations over the winter months (Boyle & Locke, 2004; Foxwell, Cripps & Dear, 2004; Neuzil, O'Connor, Gorse & Nichol, 2003; Nichol, Baken, Wuorenma & Nelson, 1999; O'Donnell et al., 2003; Yohannes & Hardy, 2003).

Recommendation 3.4:

COPD patients should receive a pneumococcal vaccine at least once in their lives (high risk patients every 5 to 10 years). (Level of Evidence =IV)

Discussion of Evidence:

Streptococcus pneumoniae may cause an acute exacerbation of COPD (Blanchard, 2002; Eller et al., 1998; Grossman, 1998; Murphy et al., 2000; Ram et al., 2004). Unlike the evidence that supports the recommendation of annual influenza vaccination, the benefits of pneumococcal vaccination in COPD patients are less established (Boyle & Locke, 2004; O'Donnell et al., 2003; Williams Jr. & Moser, 1986). Similarly Butler, Breiman, Campbell, Lipman, Broome & Facklam (1993) as cited in O'Donnell et al. (2003), indicate that the vaccine has efficiency in COPD patients of up to 65%, although a reducing effect on the frequency AECOPD has yet to be established. Despite this lack of evidence, current practice advocates pneumococcal vaccine (Yohannes & Hardy, 2003).

Oxygen Therapy

Recommendation 4.0:

Nurses will assess for hypoxemia/hypoxia and administer appropriate oxygen therapy for individuals for all levels of dyspnea. (Level of Evidence = 1b-IV)

Discussion of Evidence:

During an acute exacerbation of COPD, individuals experience an increase in the work of breathing due to the ongoing disease progression and the acute underlying pathology. This may cause difficulty in maintaining adequate oxygenation. The goal of oxygen therapy during an acute event is to reach or maintain arterial blood saturation between 89-90% and oxygen tension in the artery – PaO₂ at 60 mmHg or greater (Denniston, O'Brien & Stableforth, 2002; Goldstein, 1996; Gorecka, Gorzelak, Sliwinski, Tobiasz & Zielinski, 1997; Medical Research Council, 1981; Wedzicha, 1996; Wijskstra, Guyatt, Ambrosino, Celli, Guelli, Muir et al., 2001). Oxygen flow rates should be titrated to the lowest optimal oxygenation to minimize respiratory acidosis (PCO₂ ≤ 45 mmHg; pH ≥ 7.35) (Murphy, Driscoll, & O'Driscoll, 2001).

Acute/Unstable Dyspnea

Nocturnal (nighttime) dyspnea	(Level of Evidence = III)
Exercise-induced dyspnea	(Level of Evidence = III)

Usual treatment should include appropriate controlled oxygen therapy via a high flow system (e.g., Venturi or Vickers mask) to maintain oxygen saturation ≥ 90%-92% (Agusti, Carrera, Barbe, Munoz & Togores, 1999). In patients who cannot tolerate a face mask during an acute event, a less controlled form of oxygen therapy may be administered via nasal prongs. Inappropriate oxygen therapy may precipitate hypercapnia.

In a systematic review of the literature, Murphy et al. (2001) suggest that clinical status should be monitored carefully by continuous oximetry and arterial blood gases (ABG) measurement upon arrival to emergency department. ABG's should be checked every 60 minutes, or more if status deteriorates. If pH falls below 7.26, PaCO₂ rises above 80 and patient becomes drowsy, then non-invasive ventilation should be implemented. Ventilatory support is considered when there is evidence of respiratory muscle fatigue, inability to maintain a clear airway, increasing hypoxemia and respiratory acidosis, deterioration in level of consciousness, and inability to breathe spontaneously.

Oxygen therapy for individuals experiencing acute dyspnea may be complicated by the presence of a number of co-morbidities such as asthma, heart failure, pneumonia, pleural effusion, pulmonary embolism, pneumothorax, and sleep apnea. These individuals may require higher concentrations of oxygen therapy. Intense monitoring of their respiratory status is essential (Murphy et al., 2001). In end-stage disease, oxygen therapy may be used in conjunction with non-invasive or invasive mechanical ventilation.

Stable Dyspnea

Short or long-term oxygen therapy	(Level of Evidence = Ib)
Nocturnal (nighttime) dyspnea	(Level of Evidence = III)
Exercise-induced dyspnea	(Level of Evidence = III)

Controlled oxygen therapy is an effective prescription medication for treatment of hypoxemia in COPD. Survival benefits of long-term oxygen therapy have been established in two randomized controlled trials (Medical Research Council, 1981; Nocturnal Oxygen Therapy Trial Group, 1980). Both studies were conducted in hypoxemic COPD patients with PaO₂ of 60mmHg or less and both demonstrated that the benefits (such as amelioration of cor pulmonale, enhanced cardiac function, increased body weight, improved neuropsychological function, improved skeletal muscle metabolism, reduced pulmonary hypertension) are dose dependant. Longer-term exposure to oxygen therapy (≥ 15 hr./day) over a number of years significantly improves survival (Hjalmarsen, Melbye, Wilsgaard, Holmboe, Opdahl & Viitanen, 1999; Medical Research Council, 1981). Oxygen prescription (duration and flow) should be based on ABGs and 6-minute walk test results. Individual oxygen prescriptions may vary based on S_pO₂ values during activity, rest, and sleep (Soguel Schenkel, Burdet, de Muralt & Fitting, 1996).

Limited evidence is available to support nocturnal oxygen therapy for COPD patients with isolated nocturnal desaturation (Chaouat, Weitzenblum, Kessler, Charpentier, Ehrhart, Schott, et al., 1999), however, use of nocturnal oxygen therapy is current practice in individuals with significant co-morbidities such as cardiovascular disease and obstructive sleep apnea. Nocturnal oxygen therapy may be considered if desaturation occurs for prolonged periods (more than 30% of the time in bed at an arterial saturation of less than 88%), in the presence of pulmonary hypertension, or in association with other medical conditions that influence survival.

Soguel Schenkel et al. (1996) and Rooyackers, Dekhuijzen, Van Herwaarden & Folgering (1997) suggest that oxygen therapy prescription during exercise is not well supported by evidence, however, in current practice, oxygen during exercise is being prescribed for patients with severe COPD who become hypoxemic only when exercising. Oxygen treatment during exercise facilitates rehabilitation and permits increased activity, by decreasing ventilatory requirements and thereby reducing the work of breathing. Therefore, oxygen should be prescribed for patients with severe dyspnea, reduced ventilatory capacity and exercise tolerance even if they do not qualify to meet the criteria of long-term oxygen therapy. Demonstration of positive response to oxygen therapy in the form of reduced dyspnea and increased exercise tolerance is required.

Palliative Dyspnea

End-stage/palliative dyspnea	(Level of Evidence = III)
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In a double blind cross-over trial, Bruera, de Stoutz, Velasco-Leiva, Scholler & Hanson (1993) suggest that there is no concrete evidence for the benefits of using oxygen therapy in treatment of palliative end-stage dyspnea. However, in current clinical practice oxygen treatment in end-stage of COPD might be used as a comfort measure, best delivered by nasal canula up to 4-5 L/min.

Disease Self-Management

Recommendation 5.0:

Nurses should support disease self-management strategies including:

- **Action plan development** (*Level of Evidence = 1b*)
 - Awareness of baseline symptoms and activity level
 - Recognition of factors that worsen symptoms
 - Early symptom recognition of acute exacerbation/infection
- **End-of-life decision-making/advanced directives** (*Level of Evidence =IV*)

Discussion of Evidence:

Chronic illness such as COPD is often associated with difficulty in the development and maintenance of disease self-management strategies. Holroyd and Creer (1986) stated that self-management means having, or being able to obtain, the skills and resources necessary to best accommodate chronic disease and its consequences. Disease self-management strategies refer to those actions and behaviours that individuals with chronic disease develop to cope with their illness on a day-to-day basis. When dealing with COPD, specific self-management skills include administration and adjustment of medications, identification of early warning signs of exacerbation or infection and coping with daily episodes of dyspnea.

A number of underlying factors influence performance of self-management strategies by patients with COPD. Key factors among these are the severity of the illness, individual motivation, understanding of the self-management strategy and confidence or self-efficacy performing activities while avoiding breathlessness. A series of skills related to monitoring, decision-making, communication, and coping are required to enable COPD patients to perform self-management behaviours. Each area consists of a set of behaviours that require the mastery of many different skills. Patients may not have these skills or they may not have the ability to apply the skills. Implementing a process for COPD education and disease self-management strategies by nurses may be helpful to assist patients in the development of self-management skills.

Monninkhof, Van der Valk, Van der Palen, Van Herwaarden, Partridge & Zielhuis (2003), in a meta-analysis demonstrated that with self-management there was an increased use of courses of oral steroids and antibiotics for respiratory symptoms and a reduced need for rescue medication. In a recent randomized controlled trial, Bourbeau, Julien, Maltais et al. (2003) identified a decrease in hospital admissions and emergency room visits with improved quality of life, after patient participation in a multi-modality self-management program delivered by healthcare professionals with expertise in COPD.

The main focus in COPD is to control, manage and prevent the acute exacerbation episode, while returning the patient to a stable level of overall health function. During exacerbation, therapy consists of a combination of oxygen, bronchodilators, antibiotics and corticosteroids. Patient participation in pulmonary rehabilitation or physical reconditioning programs may or may not be suggested (Gibson, Wlodarczyk, Wilson & Sprogis, 1998). Less than 2% of patients diagnosed with COPD in Canada actually participated in pulmonary rehabilitation programs in 1996 (Brooks, Lacasse & Goldstein, 1999).

Accessibility, availability, and patient motivation are potential limiting factors associated with attendance at pulmonary rehabilitation programs. Rehabilitation programs are often inaccessible due to referral and admission criteria, limited patient awareness of programs, long waiting lists, or deterioration of health status (Brooks et al., 1999). The postponement of rehabilitation may place COPD patients at higher risk for readmission, poor symptom control, and more rapid decline in functional health status. The provision of consistent education and self-management strategies may serve as a starting or reinforcement point for many patients with COPD. This may be as simple as reinforcing appropriate use of their inhaler device or identifying the early warning signs of exacerbation.

The range of self-management interventions in formal pulmonary rehabilitation programs include various techniques for the retraining of breathing patterns which offers the patient a coping mechanism during times of acute dyspnea. Chapman, Bowie, Goldstein, Hodder, Julien, Keston et al. (1994) identified some components of rehabilitation programs that may be feasibly taught outside the formal rehabilitation setting. These components included breathing strategies, energy conservation techniques, and medication inhalation techniques. Chapman et al. (1994) suggested these forms of self-management interventions help to reduce the fear of dyspnea and improve how patients perceive and self-manage their illness on a day-to-day basis.

Watson, Town, Holbrook, Dwan, Toop & Drennan (1997) developed an action plan (see Appendix N) incorporating self-management strategies for COPD and found in a randomized controlled trial (n=56) that the intervention group readily adopted self-management skills. In response to deteriorating symptoms more patients in the intervention group initiated prednisone (34 versus 7%, p=.014) or antibiotic therapy (44 versus 7%, p=.002).

Education is an ongoing process and requires repetition and reinforcement as the patient's condition changes. The establishment of a consistent disease self-management program may provide reinforcement opportunities for a group of patients known to have frequent hospital admissions (Gibson et al., 1998).

A variety of educational strategies have been used in an attempt to optimize self-management for COPD. With researcher focus on quality of life and functional health status as outcome measures, education strategies progressed to the study of interventions more likely to impact and benefit these outcomes (Brundage, Swearingen & Woody, 1993; Devine & Percy, 1996; Howard, Davies & Roghmann, 1987; Howland, Nelson, Barlow, McHugo, Meier, Brent et al., 1986; Oberst, 1989; Perry, 1981; Ruzicki, 1989; Tougaard, Krone, Sorknaes, Ellegaard & The PASTMA Group, 1992).

In general, the literature on education strategies focused on knowledge as an outcome measure (Oberst, 1989; Ruzicki, 1989; Theis & Johnson, 1995). Yet, education for the sake of knowledge alone will not necessarily help the patient manage episodes of severe dyspnea. When dealing with patient education, a greater emphasis needs to be placed on the behavioural changes that influence and predict health self-management and control. Redman's (1996) meta-analysis of nurse initiated general patient education strategies showed conclusively that patient education contributes significantly to positive healthcare outcomes.

A meta-analysis by Devine and Percy (1996) reviewed 65 studies from 1954-1994 measuring the effect of education, exercise and psychosocial support on function and well being for COPD patients. Studies included pulmonary rehabilitation involving large muscle exercise, education and behavioural interventions over a four to six week period, and education alone. Although limited by lack of randomized controlled trials and small sample size, the evidence from Devine and Percys' meta-analysis supported the role of educational and behavioural interventions for improving the COPD patients' functional health status.

Although the terminal phase of COPD will vary from patient to patient, in the later stage any exacerbation may lead to respiratory failure and the eventuality of death. Recent studies of outcome of hospital admissions for COPD (Connors, Dawson, Thomas, Harrel Jr., Desbiens, Fulkerson et al., 1996; Nevins & Epstein, 2001; Roberts, Lowe, Bucknall, Ryland, Kelly & Pearson, 2002), suggest that there are some prognostic indicators of terminal disease including age of the patient, extent of airflow obstruction, low body mass index, inability to perform activities of daily living, increasing dyspnea despite maximal treatment and respiratory failure with admission to the intensive care unit and intubation. These criteria provide guidance for both caregivers and patients involved in the decision making process.

In a culture where death is difficult to talk about, patients with advanced COPD are often not given the opportunity to discuss their wishes with respect to the level of care they would like to receive as COPD progresses to its late stages (Heffner, 1996; Heffner, Fahy, Hilling & Barbieri, 1996). McNeely and colleagues (1997) suggest that end-of-life discussions regularly take place in the intensive care unit. They recognize that this environment is, to say the least, suboptimal. Patients are often unable to comprehend the information being provided, the questions being asked or the decisions being requested. In these times of extreme distress, family members are frequently asked to make critical decisions, including whether or not to provide life support, on behalf of the patient.

McNeely et al. (1997) contend that the primary setting provides a more appropriate venue for discussion about end-of-life care. It is important for healthcare providers to give patients and their families the opportunity to articulate and explore fears and concerns and to make decisions about end-of-life care based on those discussions. Critical decisions that must be made when a patient is in the terminal stage of COPD include: whether he/she wants active treatment for the next exacerbation, intensive care and intubation should the situation arise, antibiotics or comfort measures only.

Singer, Martin and Kelner (1999) identified patients' perspectives related to quality end-of-life care. These individuals state that they want: adequate relief of symptoms such as pain and shortness of breath, no inappropriate prolongation of life, a sense of control over their own person, opportunity to reduce the burden to their family of having to make end-of-life decisions, and a strengthening of family relationships. Advance directives, informing both caregivers and family members of the patient's wishes, can be developed based on the information exchanged during end-of-life discussions thus improving the likelihood that patients will receive the level of care they would choose when they are unable to make those decisions for themselves.

Recommendation 5.1:

Nurses should promote exercise training. (*Level of Evidence =IV*)

Recommendation 5.2:

Nurses should promote pulmonary rehabilitation. (*Level of Evidence =1a*)

Discussion of Evidence:

Incorporating a safe exercise routine to daily activity has been known to improve dyspnea, energy levels, muscle strength, activity levels and quality of life. According to a meta-analysis study conducted by Lacasse, Wong, Guyatt, King, Cook & Goldstein (1996), there are significant improvements in dyspnea and mastery for individuals with COPD who participated in pulmonary rehabilitation programs. (See Appendix O for Selection Criteria for Referral to a Pulmonary Rehabilitation Program.)

Individuals with COPD who participate in pulmonary rehabilitation programs are able to collaborate with their healthcare providers to better understand disease self-management principles which helps to prevent and/or minimize respiratory infections and disease-related deterioration. This results in decreasing the use of costly healthcare resources. Major components of pulmonary rehabilitation programs include exercise training and education focused on increasing self-management principles, and behavioural and psychosocial interventions (Garvey, 2001).

Deterioration in skeletal muscle mass can also contribute to disability in COPD. Pulmonary rehabilitation reduces disability and improves handicap (Morgan, 1999). Physical training is essential and benefits increase with training intensity (Wedzicha, Bestall, Garrod, Paul & Jones, 1998). Modes of physical training include upper extremity and lower extremity based strength and endurance training.

In order to determine a suitable exercise program, a qualified health professional with a background in exercise training specific to individuals with lung disease should prescribe a suitable exercise program based on individual needs. The exercise performance would be relatively specific to activities and muscles used (American Association of Cardiovascular and Pulmonary Rehabilitation, 1993).

The use of the Borg Scale (see Appendix P) is particularly useful for gauging symptoms of breathlessness and fatigue during exercise (American Association of Cardiovascular and Pulmonary Rehabilitation, 1993). According to the American Association of Cardiovascular and Pulmonary Rehabilitation (1993), the suggested target heart rate that is acceptable for individuals with COPD is as follows:

$$\text{Target HR} = [0.6 \times (\text{peak HR} - \text{Resting HR})] + \text{Resting HR}$$

It is very important that individuals with COPD learn to monitor their level of dyspnea and heart rate when performing exercise. An exercise prescription is based on individual needs while incorporating principles of safe exercise training. Therefore, the need to define specific guidelines for exercise is beyond the scope of this guideline.

Key Points

- Incorporating exercise into daily routine has been known to improve: dyspnea, energy levels, muscle strength, activity levels, psychological well-being.
- Individuals with COPD in advanced stages often have significant muscle wasting as a result of physical de-conditioning.
- Individuals may experience bone loss as a result of corticosteroid use. There is clear evidence to support weight-bearing exercise in the elderly population to minimize the rate of bone loss.

Education Recommendation

Recommendation 6.0:

Nurses working with individuals with dyspnea related to COPD will have the appropriate knowledge and skills to:

- Recognize the importance of individual's self report of dyspnea
- Provide COPD patient education including:
 - Smoking cessation strategies
 - Pulmonary rehabilitation/exercise training
 - Secretion clearance strategies
 - Breathing retraining strategies
 - Energy conserving strategies
 - Relaxation techniques
 - Nutritional strategies
 - Role/rationale for oxygen therapy
 - Role/rationale for medications
 - Inhaler device techniques
 - Disease self-management and action plans
 - End-of-life issues
- Conduct appropriate referrals to physician and community resources. *(Level of Evidence =IV)*

Discussion of Evidence:

Individuals with COPD need regular supervision and support by healthcare professionals who are knowledgeable about COPD and its management. In order to provide the necessary support and education to individuals with COPD, nurses who are not specialists in COPD care require basic skills in these identified areas. Education of healthcare providers about COPD best practices should address the knowledge, skill and attitudes necessary to implement the guideline recommendations.

Organization & Policy Recommendations

Organization & Policy

Recommendation 7.0:

Organizations must institutionalize dyspnea as the 6th vital sign. *(Level of Evidence = IV)*

Recommendation 7.1:

Organizations need to have in place COPD educators to teach both nurses and patients.
(Level of Evidence = IV)

Recommendation 7.2:

Organizations need to ensure that a critical mass of health professionals are educated and supported to implement this guideline in order to ensure sustainability. *(Level of Evidence = IV)*

Recommendation 7.3:

Organizations will ensure sufficient nursing staff to provide essential care, safety and support for individuals with all levels of dyspnea. *(Level of Evidence = IV)*

Recommendation 7.4:

Organizations should have available sample medication delivery devices, spacer devices, sample templates of action plans, visual analogue scales, numeric rating scales, MRC scales and patient education materials. *(Level of Evidence = IV)*

Recommendation 7.5:

Organizations need to have in place best practice guideline specific strategies to facilitate implementation. Organizations may wish to develop a plan for implementation that includes:

- A process for the assessment of the patient population (e.g., numbers, clinical diagnostic practices, co-morbidities, average length of stay) of individuals usually cared for in their institution that are living with dyspnea related to COPD.
- A process for the assessment of documentation practices related to the monitoring of dyspnea (usual and present dyspnea and dyspnea related therapies (e.g., S_pO₂).
- A process for the evaluation of the changes in the patient population and documentation strategies pre-and post-implementation.
- A process for the assessment of policies supporting the care of individuals living with dyspnea related to COPD. *(Level of Evidence = IV)*

Recommendation 7.6:

Organizations need to develop specific pre-implementation and outcome markers to monitor the impact of the implementation of this guideline on the care of individuals with dyspnea related to COPD. Organizations may wish to evaluate:

- Nursing knowledge base pre-and post-implementation.
- Length of time between acute exacerbations of COPD (AECOPD) for specific individuals (perhaps globally represented by the number of acute care admissions and/or use of acute care resources over time pre-and post-implementation).
- Development of documentation strategies to monitor and enhance care of individuals living with dyspnea related to COPD (integration of usual and present dyspnea on vital sign records within the institution).
- Development of policies institutionalizing an education program for nurses caring for individuals living with dyspnea related to COPD. (*Level of Evidence =IV*)

Discussion of Evidence:

To date no evidence exists regarding the use of specific pre- and post-implementation markers characterizing the effectiveness or sustainability of a specific best practice guideline. However, the development panel for this guideline is suggesting that the above markers would assist organizations in gaining an understanding of the population of individuals living with disabling dyspnea associated with COPD in their institutions. Some of the suggested strategies such as tracking the time between AECOPD and/or the use of acute care facilities would create an important database and assist in determining some of the impact on the quality of care for these individuals as a result of the guideline's implementation.

Recommendation 7.7:

Nursing best practice guidelines can be successfully implemented only where there are adequate planning, resources, organizational and administrative support. Organizations may wish to develop a plan for implementation that includes:

- An assessment of organizational readiness and barriers to education.
- Involvement of all members (whether in a direct or indirect supportive function) who will contribute to the implementation process.
- Dedication of a qualified individual to provide the support needed for the education and implementation process.
- Ongoing opportunities for discussion and education to reinforce the importance of best practices.
- Opportunities for reflection on personal and organizational experience in implementing guidelines.

In this regard, RNAO (through a panel of nurses, researchers and administrators) has developed the *Toolkit: Implementation of Clinical Practice Guidelines*, based on available evidence, theoretical perspectives and consensus. The RNAO strongly recommends the use of this *Toolkit* for guiding the implementation of the best practice guideline on *Nursing Care of Dyspnea: The 6th Vital Sign in Individuals with Chronic Obstructive Pulmonary Disease (COPD)*. (*Level of Evidence = IV*)

Discussion of Evidence:

The Registered Nurses' Association of Ontario (through a panel of nurses, researchers and administrators) has developed the *Toolkit: Implementation of Clinical Practice Guidelines* (RNAO, 2002b), based on available evidence, theoretical perspectives and consensus. The *Toolkit* is recommended for guiding the implementation of the RNAO Best Practice Guideline, *Nursing Care of Dyspnea: The 6th Vital Sign for Individuals with Chronic Obstructive Pulmonary Disease (COPD)*. Successful implementation of best practice guidelines requires the use of a structured, systematic planning process and strong leadership from nurses who are able to transform the evidence-based recommendations into policies and procedures that impact on practice within the organization. The RNAO *Toolkit* (2002b) provides a structured model for implementing practice change. Please refer to Appendix Q for a description of the *Toolkit*.

Programs/Services

Recommendation 8.0:

Pulmonary rehabilitation programs must be available for individuals with COPD to enhance quality of life and reduce healthcare costs. (Level of Evidence = 1a)

Discussion of Evidence:

A meta-analysis of 23 randomized controlled trials in COPD showed that pulmonary rehabilitation significantly improved dyspnea, exercise endurance and quality of life compared with standard care (Lacasse et al., 1996). According to the Canadian Thoracic Society guidelines (O'Donnell et al., 2003), it was estimated in 1999 that there were only 36 pulmonary rehabilitation programs in Canada, serving less than 1% of the Canadian COPD population. The RNAO guideline development panel concurs with the Canadian Thoracic Society recommendations that there is a need to develop strategies to improve the availability of pulmonary rehabilitation, deliver rehabilitation at a lower cost per patient and implement self-monitored, but supervised, home-based rehabilitation programs.

Recommendation 8.1:

Palliative care services must be available for individuals living with COPD and their caregivers. (Level of Evidence = III)

Discussion of Evidence:

Abrahm and Hansen-Flaschen (2002) and Hansen-Flaschen (1997) suggest that the quality of life of patients with advanced COPD is often poor and can be challenging. According to the Canadian Thoracic Society guideline (O'Donnell et al., 2003), lack of access to formal palliative care services means that discussion of end-of-life issues often occur too late, are held in inappropriate settings and do not meet the expectations of patients. Abrahm and Hansen-Flaschen (2002) suggest that patients with terminal, non-malignant lung diseases are underserved. Better access to palliative care services is necessary. The Canadian Thoracic Society further recommends that healthcare organizations should consider whether changes are warranted to institutional policies and procedures to identify hospitalized patients at risk of dying and to systematically ensure that end-of-life care discussions take place between clinicians, and patients and their families

Recommendation 8.2:

Nursing research related to interventions for individuals with COPD must be supported.

(Level of Evidence = IV)

Recommendation 8.3:

All Nursing programs should include dyspnea associated with COPD as one context for learning core curricula concepts. *(Level of Evidence = IV)*

Discussion of Evidence:

Nurses play a vital role in the care of patients with dyspnea associated with COPD. They are in a pivotal position to facilitate evidence-based, team approach to treatment. If nurses are to fulfill these roles, nurses must be better equipped to assess individuals and intervene for all levels of dyspnea. The skill sets required to meet the needs of dyspneic patients with COPD must be taught in nursing programs.

Nursing research related to interventions for individuals with COPD must also be supported in order to have better understanding of effective approaches to care for individuals with dyspnea.

Recommendation 8.4:

Funding regulations for oxygen therapy must be revisited to include those individuals with severe dyspnea, reduced ventilatory capacity and reduced exercise tolerance who do not qualify under the current criteria. *(Level of Evidence = IV)*

Discussion of Evidence:

According to the Canadian Thoracic Society guidelines (O'Donnell et al., 2003), the longer the patients are exposed to supplemental oxygen, the larger the benefits in terms of survival. However, the current funding criteria in Ontario for oxygen therapy excludes those individuals with severe dyspnea, reduced ventilatory capacity and reduced exercise tolerance. The RNAO guideline development panel advocates that changes be made to funding regulations to include those individuals who do not qualify under the current criteria.

Dyspnea is the most disabling symptom of COPD. The disabilities associated with COPD are not always overtly recognizable and may reduce one's social status, economic situation and sense of self. Traditionally, disability has been defined as a visible functional limitation recognizable by physical limitations that require the use of a cane, walker or wheelchair. Funding agencies do not always award for shortness of breath or physical deterioration experienced in COPD. Some individuals living with COPD may have an oxygen tank with them when they are at home and out in public. This may be viewed as a visible sign of disability, however, funding regulations do not address it as such and therefore individuals are denied funding and services that those with visible functional limitations receive. The RNAO guideline development panel advocates that changes be made to funding for assistive transportation (e.g., Handi Transit, Wheel Trans) so that COPD is recognized as a disability.

Research Gaps & Future Implications

The guideline development panel found that much more work is needed to be done in the following areas:

- Teaching of breathing retraining techniques: pursed lip breathing, diaphragmatic breathing, controlled breathing
- Activities of daily living (ADLs)
- Experience of dyspnea in acute and chronic situations
- Dyspnea in relation to rehabilitation and disability
- Interdisciplinary research in management of dyspnea in COPD
- End-of-life and dyspnea
- Oxygen criteria
- Assessment tools related to dyspnea
- Dyspnea anxiety related to the cycle of disease process
- Impact of dyspnea on individual and family
- Dyspnea and the nurse interaction with individual
- Understanding of dyspnea and COPD from patient, nurses and family perspectives

The above list, although in no way exhaustive, is an attempt to identify and prioritize the enormous amount of research that is needed in this area. While some of the recommendations in the guideline are based on evidence gained from experimental research, a number of the other recommendations are supported by a slowly increasing body of research in the qualitative paradigm and a consensus of expert opinion. This reality makes clear that there is much research work to be done. Practitioners and nurse researchers, in partnership, need to expand the empirical work to better understand the experience of dyspnea for individuals living with COPD in order to enhance the care they provide.



Evaluation & Monitoring of Guideline

Organizations implementing the recommendations in this nursing best practice guideline are encouraged to consider how the implementation and its impact will be monitored and evaluated. The following table, based on a framework outlined in the *RNAO Toolkit: Implementation of Clinical Practice Guidelines* (2002b) illustrates some indicators for monitoring and evaluation:

Level of Indicator	Structure	Process	Outcome
Objectives	To evaluate the supports available in the organization that allow for nurses to deliver care to patients with dyspnea related to COPD.	To evaluate the changes in practice that lead towards dyspnea assessment and management for patients with COPD.	To evaluate the impact of implementation of the recommendations.
Organization	<ul style="list-style-type: none"> • Policy and procedures that require nursing dyspnea assessment in all patients with COPD are in place. • Availability of forms to facilitate documentation of dyspnea assessment by nurses. • Availability of patient education resources. • Provision of accessible resource people (e.g., respiratory nurse educators) for nurses to consult for ongoing support. 	<ul style="list-style-type: none"> • Percentage of patients with COPD who have their dyspnea assessment documented. • Percentage of patients who smoke who are assessed for dyspnea documented. • Percentage of patients who smoke who are offered smoking cessation documented. 	<ul style="list-style-type: none"> • Achievement of targets for patient outcome improvements. • Patient satisfaction with dyspnea care. • Improvement in quality of life scores for patients with dyspnea.
Nurse	<ul style="list-style-type: none"> • Availability of educational opportunities related to assessment and management of dyspnea as the 6th vital sign in individuals with COPD within the organization. • Number of nurses attending educational sessions related to promoting appropriate assessment and management of dyspnea related to COPD. 	<ul style="list-style-type: none"> • Level of dyspnea assessed. • Nurse's self assessment knowledge of: <ul style="list-style-type: none"> • Early warning signs of COPD exacerbation. • Main categories of COPD medications. • Correct inhaler device technique. • Available educational and community resources. 	<ul style="list-style-type: none"> • Evidence of documentation in patient record consistent with guideline recommendations regarding: <ul style="list-style-type: none"> • assessment of level of dyspnea. • assessment of inhaler device technique. • recommended referral to pulmonary rehabilitation.
Patient	<ul style="list-style-type: none"> • Total percentage of patients with COPD. 	<ul style="list-style-type: none"> • Percentage of patients reporting that the nurse reviewed COPD disease self-management strategies and action plan. • Percentage of patients reporting that the nurse recommended a referral to pulmonary rehabilitation programs. • Percentage of patients reporting that the nurse reviewed and asked for a return demonstration of inhaler device. 	<ul style="list-style-type: none"> • Percentage of patients with an action plan. • Percentage of patients with a referral to pulmonary rehabilitation. • Percentage of patients judged to have satisfactory inhaler device technique. • Percentage of patients with COPD readmitted to hospital within 30 days post-discharge.
Financial Costs	<ul style="list-style-type: none"> • Provision of adequate human and financial resources for guideline implementation. 	<ul style="list-style-type: none"> • Cost for staff education and provision of supportive resources. • Cost of resource allocation for patients delayed for pulmonary rehabilitation. • Cost benefit analysis related to caring for COPD patients. 	<ul style="list-style-type: none"> • Number of emergency room (ER) visits. • Length of time to next hospital admission • Number of referrals to pulmonary rehabilitation. • Length of wait time for admission to pulmonary rehabilitation program.

Implementation Strategies

The Registered Nurses' Association of Ontario and the guideline development panel have compiled a list of implementation strategies to assist healthcare organizations or healthcare disciplines who are interested in implementing this guideline. A summary of these strategies follows:

- Have at least one dedicated person such as an advanced practice nurse or a clinical resource nurse who will provide support, clinical expertise and leadership. The individual should also have good interpersonal, facilitation and project management skills.
- Conduct an organizational needs assessment related to dyspnea management associated with COPD to identify current knowledge base and further educational requirements.
- Initial needs assessment may include an analysis approach, survey and questionnaire, group format approaches (e.g., focus groups), and critical incidents.
- Establish a steering committee comprised of key stakeholders and interdisciplinary members committed to lead the change initiative. Identify short term and long term goals. Keep a work plan to track activities, responsibilities and timelines.
- Create a vision to help direct the change effort and develop strategies for achieving and sustaining the vision.
- Program design should include:
 - Target population
 - Goals and objectives
 - Outcome measures
 - Required resources (human resources, facilities, equipment)
 - Evaluation activities
- Design educational sessions and provide ongoing support for implementation. The education sessions may consist of Power Point presentations, facilitator's guide, handouts and case studies. Binders, posters and pocket cards may be used as ongoing reminders of the training. Plan education sessions that are interactive, include problem solving, address issues of immediate concern and offer opportunities to practice new skills (Davies & Edwards, 2004).
- Provide organizational support such as having the structures in place to facilitate the implementation. For example, hiring replacement staff so participants will not be distracted by concerns about work and having an organizational policy that reflects the value of best practices through policies and procedures. Develop new assessment and documentation tools (Davies & Edwards, 2004).
- Identify and support designated best practice champions on each unit to promote and support implementation. Celebrate milestones and achievements, acknowledging work well done (Davies & Edwards, 2004).

In addition to the strategies mentioned above, the RNAO has developed resources that are available on the website. A *Toolkit* for implementing guidelines can be helpful if used appropriately. A brief description about this *Toolkit* can be found in Appendix Q. A full version of the document in pdf format is also available at the RNAO website, www.rnao.org/bestpractices.

Process For Update/Review of Guideline

The Registered Nurses' Association of Ontario proposes to update this best practice guideline as follows:

1. Each nursing best practice guideline will be reviewed by a team of specialists (Review Team) in the topic area every three years following the last set of revisions.
2. During the three-year period between development and revision, RNAO Nursing Best Practice Guidelines program staff will regularly monitor for relevant new literature in the subject area.
3. Based on the results of the monitor, program staff will recommend an earlier revision period. Appropriate consultation with a team of members comprised of original panel members and other specialists in the field will help inform the decision to review and revise the guideline earlier than the three-year milestone.
4. Three months prior to the three year-review milestone, the program staff will commence the planning of the review process by:
 - a. Inviting specialists in the field to participate in the Review team. The Review Team will be comprised of members from the original panel as well as other recommended specialists.
 - b. Compiling feedback received, questions encountered during the dissemination phase as well as other comments and experiences of implementation sites.
 - c. Compiling new clinical practice guidelines in the field, systematic reviews, meta-analysis papers, technical reviews, randomized controlled trial research, and other relevant literature.
 - d. Developing a detailed work plan with target dates and deliverables.

The revised guideline will undergo dissemination based on established structures and processes.



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Appendix A: Search Strategy for Existing Evidence

STEP 1 – Database Search

A database search for existing chronic obstructive pulmonary disease guidelines was conducted by a university health sciences library. An initial search of the Medline, Embase and CINAHL databases for guidelines and articles published from January 1, 1995 to December 2003 was conducted using the following search terms: “chronic obstructive pulmonary disease”, “COPD”, “chronic obstructive lung disease”, “COLD”, “chronic bronchitis”, “emphysema”, “family caregivers”, “coping with chronic illness”, “oxygen devices”, “rehabilitation”, “assessing control”, “medications”, “randomized controlled trials”, “systematic reviews”, “practice guideline(s)”, “clinical practice guideline(s)”, “standards”, “consensus statement(s)”, “consensus”, “evidence based guidelines” and “best practice guidelines”.

STEP 2 – Structured Website Search

One individual searched an established list of websites for content related to the topic area. This list of sites, reviewed and updated in October 2002, was compiled based on existing knowledge of evidence-based practice websites, known guideline developers, and recommendations from the literature. Presence or absence of guidelines was noted for each site searched as well as date searched. The websites at times did not house a guideline but directed to another website or source for guideline retrieval. Guidelines were either downloaded if full versions were available or were ordered by phone/e-mail.

- Agency for Healthcare Research and Quality: <http://www.ahrp.gov>
- Alberta Heritage Foundation for Medical Research – Health Technology Assessment: <http://www.ahfmr.ab.ca/hta>
- Alberta Medical Association – Clinical Practice Guidelines: <http://www.albertadoctors.org>
- American College of Chest Physicians: <http://www.chestnet.org/guidelines>
- American Medical Association: <http://www.ama-assn.org>
- British Medical Journal – Clinical Evidence: <http://www.clinicalevidence.com>
- Canadian Coordinating Office for Health Technology Assessment: <http://www.ccohta.ca>
- Canadian Task Force on Preventive Healthcare: <http://www.ctfphc.org>
- Centers for Disease Control and Prevention: <http://www.cdc.gov>
- Centre for Evidence-Based Mental Health: <http://www.cebmh.com>
- Centre for Evidence-Based Pharmacotherapy: <http://www.aston.ac.uk/lhs/teaching/pharmacy/cebp>
- Centre for Health Evidence: <http://www.cche.net/che/home.asp>
- Centre for Health Services and Policy Research: <http://www.chspr.ubc.ca>
- Clinical Resource Efficiency Support Team (CREST): <http://www.crestni.org.uk>
- CMA Infobase: Clinical Practice Guidelines: <http://mdm.ca/cpgsnew/cpgs/index.asp>
- Cochrane Database of Systematic Reviews: <http://www.update-software.com/cochrane>
- Database of Abstracts of Reviews of Effectiveness: <http://nhscrd.york.ac.uk/darehp.htm>
- Evidence-based On-Call: <http://www.eboncall.org>
- Government of British Columbia – Ministry of Health Services: <http://www.hlth.gov.bc.ca/msp/protoguides/index.html>
- Institute for Clinical Systems Improvement: <http://www.icsi.org/index.asp>
- Institute of Child Health: <http://www.ich.ucl.ac.uk/ich>
- Joanna Briggs Institute: <http://www.joannabriggs.edu.au/about/home.php>

Nursing Care of Dyspnea: The 6th Vital Sign in Individuals with Chronic Obstructive Pulmonary Disease (COPD)

- Medic8.com: <http://www.medic8.com/ClinicalGuidelines.htm>
- Medscape Women's Health: <http://www.medscape.com/womenshealthhome>
- Monash University Centre for Clinical Effectiveness: <http://www.med.monash.edu.au/healthservices/cce/evidence>
- National Guideline Clearinghouse: <http://www.guidelines.gov>
- National Institute for Clinical Excellence: <http://www.nice.org.uk>
- National Library of Medicine Health Services/Technology Assessment: <http://hstat.nlm.nih.gov/hq/Hquest/screen/HquestHome/s/64139>
- Netting the Evidence: A SchARR Introduction to Evidence-Based Practice on the Internet: <http://www.shef.ac.uk/scharr/ir/netting>
- New Zealand Guidelines Group (NZGG): <http://www.nzgg.org.nz>
- NHS Centre for Reviews and Dissemination: <http://www.york.ac.uk/inst/crd>
- NHS Nursing & Midwifery Practice Development Unit: <http://www.nmpdu.org>
- NHS R & D Health Technology Assessment Programme: <http://www.hta.nhsweb.nhs.uk/htapubs.htm>
- PEDro: The Physiotherapy Evidence Database: <http://www.pedro.fhs.usyd.edu.au/index.html>
- Queen's University at Kingston: <http://post.queensu.ca/~bhc/gim/cpgs.html>
- Royal College of General Practitioners: <http://www.rcgp.org.uk>
- Royal College of Nursing: <http://www.rcn.org.uk/index.php>
- Royal College of Physicians: <http://www.rcplondon.ac.uk>
- Sarah Cole Hirsch Institute: <http://fpb.cwru.edu/HirshInstitute>
- Scottish Intercollegiate Guidelines Network (SIGN): <http://www.sign.ac.uk>
- Society of Obstetricians and Gynecologists of Canada Clinical Practice Guidelines: http://www.sogc.medical.org/sogcnet/index_e.shtml
- The Canadian Cochrane Network and Centre: <http://cochrane.mcmaster.ca>
- The Qualitative Report: <http://www.nova.edu/ssss/QR>
- Trent Research Information Access Gateway: <http://www.shef.ac.uk/scharr/triage/TRIAGEindex.htm>
- TRIP Database: <http://www.tripdatabase.com>
- U.S. Preventive Service Task Force: <http://www.ahrq.gov/clinic/uspstfix.htm>
- University of California, San Francisco: <http://medicine.ucsf.edu/resources/guidelines/index.html>
- University of Laval – Directory of Clinical Information Websites: <http://132.203.128.28/medecine>
- University of York – Centre for Evidence-Based Nursing: <http://www.york.ac.uk/health-sciences/centres/evidence/cebn.htm>

STEP 3 – Search Engine Web Search

A website search for existing chronic obstructive pulmonary disease guidelines was conducted via the search engine “Google”, using the search terms identified above. One individual conducted this search, noting the results of the search term results, the websites reviewed, date and a summary of the findings. The search results were further critiqued by a second individual who identified guidelines and literature not previously retrieved.

STEP 4 – Hand Search/Panel Contributions

Additionally, panel members were already in possession of a few of the identified guidelines. In some instances, a guideline was identified by panel members and not found through the previous search strategies. These were guidelines that were developed by local groups or specific professional associations and had not been published to date.

STEP 5 – Core Screening Criteria

This above search method revealed 13 guidelines, several systematic reviews and numerous articles related to chronic obstructive pulmonary disease.

The final step in determining whether the clinical practice guideline would be critically appraised was to have two individuals screen the guidelines based on the following criteria. These criteria were determined by panel consensus:

- Guideline was in English, international in scope.
- Guideline dated no earlier than 1997.
- Guideline was strictly about the topic area.
- Guideline was evidence-based (e.g., contained references, description of evidence, sources of evidence).
- Guideline was available and accessible for retrieval.

RESULTS OF THE SEARCH STRATEGY

The results of the search strategy and the decision to critically appraise identified guidelines are detailed below. Nine guidelines met the screening criteria and were critically appraised using the *Appraisal of Guidelines for Research and Evaluation* (AGREE Collaboration, 2001) *instrument*.



TITLE OF THE PRACTICE GUIDELINES CRITICALLY APPRAISED

Abman, S., Alpers, J., Ambrosina, N., Barnes, P., Bateman, E., Beasley, R. et al. (1997). BTS guidelines for the management of chronic obstructive pulmonary disease. *Thorax*, 52(Suppl 5), S1-S28.

Clinical Epidemiology and Health Service Evaluation Unit (1999). *Evidence based guidelines Royal Melbourne Hospital - Hospital management of an acute exacerbation of chronic obstructive pulmonary disease*. Melbourne: National Health and Medical Research Council.

Institute for Clinical Systems Improvement (2003). Health care guideline: Chronic obstructive pulmonary disease. Institute for Clinical Systems Improvement [Electronic version]. Available: www.icsi.org

McKenzie, D. K., Frith, P. A., Burdon, J. G. W., & Town, I. (2003). The COPDX Plan: Australian and New Zealand guidelines for the management of chronic obstructive pulmonary disease 2003. *Medical Journal of Australia*, 178(6 Suppl), S1-S40.

Northern Regional COPD Board (2003). *The COPD booklet: Guidelines to best practice for management of stable COPD*. New Zealand: COPD Board, Northern Region.

O'Donnell, D. E., Aaron, S., Bourbeau, J., Hernandez, P., Marciniuk, D., Balter, M. et al. (2003). Canadian Thoracic Society recommendations for management of chronic obstructive pulmonary disease - 2003. *Canadian Respiratory Journal*, 10(Suppl. A), 11A-65A.

Pauwels, R. A., Buist, A. S., Jenkins, C. R., Hurd, S. S., & the GOLD Scientific Committee (2001). Global strategy for the diagnosis, management, and prevention of chronic obstructive pulmonary disease: National Heart, Lung, and Blood Institute and World Health Organization Global Initiative for Chronic Obstructive Lung Disease (GOLD): Executive summary. *Respiratory Care*, 46(8), 798-825.

Philippine College of Chest Physicians (2003). Clinical practice guidelines in the diagnosis and management of chronic obstructive pulmonary disease (COPD) in the Philippines. *Philippine Journal of Chest Diseases*, 1-55.

Veterans Health Administration (2000). VHA/DOD clinical practice guideline for the management of chronic obstructive pulmonary disease. Clinical Practice Guidelines Office of Quality and Performance [Electronic version]. Available: http://www.oqp.med.va.gov/cpg/COPD/COPD_base.htm

Appendix B: Glossary of Terms

Agonist: A substance that mimics, stimulates or enhances the normal physiological response of the body.

Beta 2 Agonist: A group of bronchodilators resulting in smooth muscle relaxation and bronchodilation through stimulation of β_2 receptors found on airway smooth muscle.

Bronchoconstriction: A narrowing of the airway caused by bronchial smooth muscle contraction (tightening) and airway inflammation (swelling).

Bronchodilators: A category of medication that produce relaxation of the smooth muscles surrounding the bronchi, resulting in dilatation of the airways. See Relievers.

Chronic Obstructive Pulmonary Disease (COPD): A progressive and irreversible condition characterized by diminished inspiratory and expiratory capacity of the lungs. The person complains of dyspnea with physical exertion, difficulty in inhaling or exhaling deeply, and sometimes of a chronic cough. The condition may result from chronic bronchitis, pulmonary emphysema, asthma, or chronic bronchiolitis and is aggravated by cigarette smoking and air pollution.

Definition of Multidisciplinary versus Interdisciplinary

Multidisciplinary and interdisciplinary are terms that have been used interchangeably. However, when one examines the definitions more closely there are subtle differences. Garner's definition of multidisciplinary describes the concept of the 'gatekeeper' where one determines which other disciplines are invited to participate in an independent, discipline-specific team that conducts separate assessment, planning and provision of service with little coordination. This process involves independent decision-making rather than coordination of information (Garner, 1995).

Interdisciplinary team processes establish collaborative team goals and produce a collaborative service plan where team members are involved in problem solving beyond the confines of their discipline (Dyer, 2003).

According to the American Heritage Dictionary (2000), multidisciplinary is defined as of, relating to, or making use of several disciplines at once: a multidisciplinary approach to teaching where as it defines interdisciplinary as of, relating to, or involving two or more academic disciplines that are usually considered distinct.

The American Association of Cardiovascular and Pulmonary Rehabilitation (1993) states that it is not necessary for every member of a multidisciplinary team to assess each patient. However, the collective knowledge, skills and clinical experiences of the professional staff should reflect the multidisciplinary expertise necessary to achieve the desired program and patient goals. Team communication and interaction are vital to successful rehabilitation of the pulmonary patient.

Dyspnea: Subjective symptom of difficult or uncomfortable breathing. It is the most common disabling symptom of COPD.

FVC (forced vital capacity in liters): The maximal volume of air exhaled using maximal effort following maximal inspiration. The normal range is higher than 80% of the predicted value.

FEV₁ (forced expiratory volume in one second in liters): The volume of air exhaled during the first second. This is the most important measurement for following obstructive lung disease and determines the severity of airway obstruction. The normal range is 80% of the predicted value. The normal rate of decline in lung function due to aging is about 30 ml. of FEV₁ per year in adults. Patients who smoke in whom COPD is developing have decreases in FEV₁ of 60 - 120 ml./year.

FEV₁/FVC Ratio: The ratio is used to detect airways obstruction. As a rule of thumb, a ratio of less than 70% indicates an obstructive disorder in middle-aged adults. The spirometer should calculate the exact lower limit of the normal range for other ages.

Hypercapnia: A term used to indicate an increase in the normal amounts of carbon dioxide in the blood.

Hypoxemia: A term describing a decrease in arterial oxygen tension in the blood or insufficient oxygenation of the blood.

Hypoxia: A broad term used to indicate an inadequate supply of oxygen at the cellular level or decreased concentration of oxygen in the inspired air.

Metered Dose Inhaler (MDI): A hand activated device used for delivering an aerosolized medication to the lung.

Pulmonary Rehabilitation: An art of medical practice wherein an individually tailored, multidisciplinary program is formulated which through accurate diagnosis, therapy, emotional support and education, stabilizes or reverses both the physio- and psychopathology of pulmonary diseases and attempts to return the patient to the highest possible functional capacity allowed by his/her pulmonary handicap and overall life situation (American Association of Cardiovascular and Pulmonary Rehabilitation, 1993; American College of Chest Physicians & American Association of Cardiovascular Pulmonary Rehabilitation Guidelines Panel, 1997).

Relievers: Relievers are medications that are used to relieve COPD symptoms and to prevent COPD symptoms prior to exercise, exposure to cold air or triggers. See Beta 2 agonists and Bronchodilators.



Appendix C: Visual Analogue Scale As A Measure of Clinical Dyspnea

Below are 2 visual analogue scales to measure clinical dyspnea. Each scale is 100 mm in length.

SCALE A: Horizontal Visual Analogue Scale

How much shortness of breath are you having right now? Please indicate by marking the line. If you are not experiencing any shortness of breath at present, circle the marker at the left end of the line.



SCALE B: Vertical Visual Analogue Scale

How much shortness of breath are you having right now? Please indicate by marking the height of the column. If you are not experiencing any shortness of breath at present, circle the marker at the bottom of the column.



Reprinted with permission:
Gift, A. (1989). Validation of a vertical visual analogue scale as a measure of clinical dyspnea. *Rehabilitation Nursing*, 14(6), 323-325.

Appendix D: Numeric Rating Scale As A Measure of Clinical Dyspnea

On a scale from 0 to 10

Indicate how much shortness of breath you are having right now.

**With 0 = no shortness of breath
And 10 = shortness of breath as bad as can be**

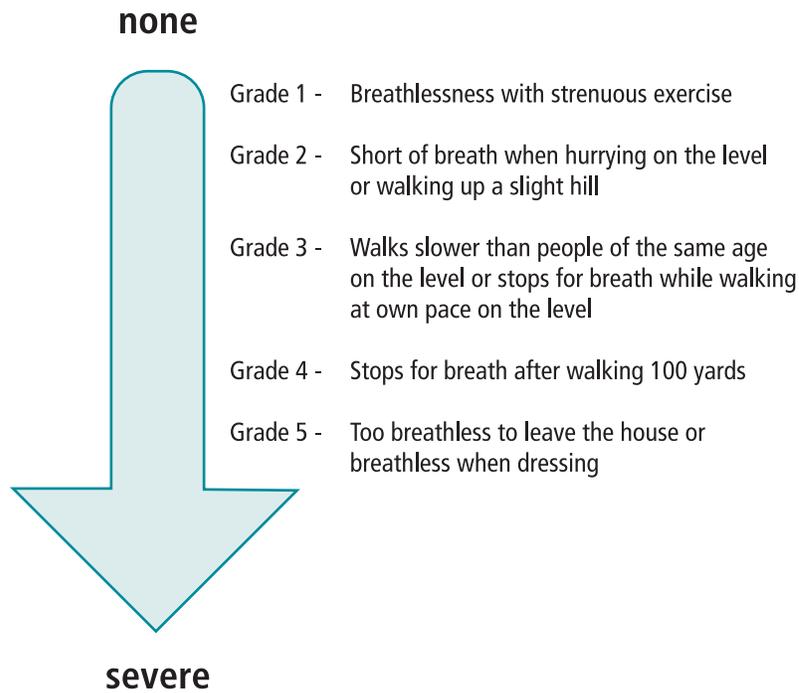
Circle the number:

0 1 2 3 4 5 6 7 8 9 10

Reprinted with permission:
Gift, A. & Narsavage, G. (1998). Validity of the numeric rating scale as a measure of dyspnea. *American Journal of Critical Care*, 7(3), 200-204.

Appendix E: Medical Research Council Dyspnea Scale

The Medical Research Council Dyspnea Scale can be used to assess shortness of breath and disability in chronic obstructive pulmonary disease.



Reproduced with permission: Pulsus Group Inc., Canadian Respiratory Journal 2003 10; 11A-65A.
O'Donnell, D. E., Aaron, S., Bourbeau, J., Hernandez, P., Marciniuk, D., Balter, M. et al. (2003). Canadian Thoracic Society recommendations for management of chronic obstructive pulmonary disease – 2003. *Canadian Respiratory Journal*, 10(Suppl. A), 11A-65A.

Appendix F: Summary of Dyspnea Assessment Tools

Present Dyspnea Scales		Reliability and Validity		Comments		Description of Tool	
Visual Analogue Scale (VAS)	Source	Reliability and Validity		Comments		Description of Tool	
Visual Analogue Scale (VAS)	Gift, 1989 Grant, Aitchison, Henderson, Christie Zare, McMurray et al., 1999	Correlation of vertical VAS with horizontal VAS was $r=.97$ and with Peak Expiratory Flow Rate (PEFR) $r=.85$ in asthmatic patients; $n=15$. Construct validity was established by having subjects with asthma and with COPD rate dyspnea during times of severe and little airway obstruction; $N=20$. (Gift, 1989) Reproducibility coefficients as high as 78%. Sensitivity ratio was 2.7 (Grant et al., 1999)		Both concurrent and construct validity established. Useful for measurement of multiple sensations associated with dyspnea. Better reproducibility and sensitivity than Borg Scale in normal subjects.		100 mm horizontal or vertical measure line, which is frequently anchored at each end by the descriptors (no breathlessness and greatest breathlessness) (Carone, Donner & Jones, 2001)	
Numeric Rating Scale (NRS)	Gift & Narsavage, 1998	High correlation of NRS scores with VAS		Scores for present dyspnea poorly correlated with usual dyspnea, therefore seen as a different construct. Low correlation between dyspnea scores and FEV ₁		Looks like a VAS but has numeric gradations along the line with descriptors	
Modified Borg Scale (MBS)	Kendrick, Baxi & Smith, 2000	Retrospective correlational study; correlation between PEFR, SaO ₂ and Modified Borg Scale pre- and post-therapy. $N = 102$		Correlation between change in PEFR and MBS was $-.42$, $p<.0001$. No correlation between SaO ₂ change and change in MBS. Patients gave the MBS tool a high satisfaction rating on ease of use, felt that the language in it adequately expressed their dyspnea. Frequently used in rehabilitation.		Category-ratio-10 scale consists of verbal descriptors adjacent to specific numbers, the spacing of the number and corresponding descriptors essentially providing a category scale with ratio properties (Carone et al., 2001).	
Usual Dyspnea Scales							
Medical Research Council (MRC) Dyspnea Scale	Bestall et al., 1999	Comparisons with spirometric tests, blood gas tensions, shuttle walking test and Borg scores pre- and post-exercise. St George's Respiratory Questionnaire (SGRQ) and Chronic Respiratory Questionnaire (CRQ), Nottingham Extended Activities of Daily Living score (EADL) and Hospital Anxiety and Depression score were also assessed. $N= 100$ patients with COPD. There was a significant association between MRC grade and shuttle distance, SGRQ and CRQ scores, mood state and EADL.		Concludes that MRC scale is a simple and valid method of categorizing disability that could be used to complement FEV ₁ in classification of COPD severity.		Four point scale on which patients are asked to indicate the level of activity that causes dyspnea (Carone et al., 2001)	

Present Dyspnea Scales	Source	Reliability and Validity	Comments	Description of Tool
Baseline Dyspnea Index (BDI) and Transitional Dyspnea Index (TDI)	Aaron, Vandemheen, Clinch, Ahuja, Brison, Dickinson et al., 2002 Mahler, Weimberg, Wells & Feinstein, 1984 Witek & Mahler, 2003a; 2003b	Significantly correlated with the dyspnea diary score and the symptom and activity component of the St. George's respiratory questionnaire, establishing concurrent validity. Association between baseline FEV ₁ and BDI and change in FEV ₁ and TDI established construct validity. TDI showed significant positive correlation with changes in clinical status and all four domains of the chronic respiratory disease index questionnaire.	Validity established in both English and non-English speakers. A 1-unit change in the TDI score is considered clinically significant.	An observer scores the patient's severity of breathlessness for each of the three dimensions, based on responses to various questions for the BDI. The TDI is used to denote changes from the initial assessment.
Oxygen Cost Diagram	Oga, Nishimura, Tsukino, Hajiro, Ikeda & Mishiman, 2002.	Correlated significantly with exercise capacity.	Found to be an important predictor of exercise capacity, especially the walking test.	VAS with 13 daily activities ranked along the 100 mm vertical line in proportion to their associated oxygen cost. The patient marks the point above which a task would have to be stopped because of breathlessness (Carone et al., 2001).
Breathlessness, Cough and Sputum Scale (BCSS)	Celli, Halpin, Hepburn, Byrne, Keating & Goldman, 2003 Leidy, Schmier, Jones, Lloyd & Rocchiccioli, 2003	Mean changes in BCSS score were compared with percentage change in symptoms, change in FEV ₁ , and change in St. George Respiratory Questionnaire (SGRQ). N=2971 (Leidy et al., 2003).	Patient reported daily symptom data (BCSS) are sensitive to change and useful for both observational studies and controlled clinical trials of patients with COPD (Leidy et al., 2003). Scale useful for clinical evaluation of new drugs for the treatment of COPD (Celli et al., 2003). BCSS is a reliable, valid and responsive patient-reported outcome measure of symptom severity in patients with COPD (Leidy et al., 2003).	Daily diary in which subjects record the severity of three symptoms of COPD: breathlessness, cough, and sputum on a 5-point Likert scale.
University of California at San Diego Shortness of Breath Questionnaire (SOBQ)	Eakin, Resnikoff, Prewitt, Ries & Kaplan, 1998	N=28 subjects with COPD. Excellent internal consistency demonstrated. Significant correlations with exercise tolerance.	Conclude that it is a valuable assessment tool in both clinical practice and research.	24-item questionnaire measuring dyspnea during the past week; patients are asked about the frequency of dyspnea when performing 21 different activities on a 6-point rating scale (Carone et al., 2001).
Quality of Life Scales				
Chronic Respiratory Questionnaire (CRQ) and Chronic Respiratory Questionnaire Self-report (CRQ – SR)	Hajiro, Nishimura, Tsukino, Ikeda, Koyama & Izumi, 1998	N=52. There were no statistically significant differences between CRQ and CRQ-SR in domains of mastery and fatigue; no clinically significant differences in domains of dyspnea and emotional function. Test-retest reliability high in CRQ-SR.	CRQ-SR is a reproducible, reliable and stable measure of health status that is quick to administer.	CRQ: Interviewer administered questionnaire measuring severity of dyspnea on a 1 (extremely short of breath) to 7 (not at all short of breath) scale on the 5 most bothersome activities that elicited breathlessness during the last 2 weeks as selected by the patient (Carone et al., 2001). CRQ-SR is similar to CRQ; format was changed to make it easier for patients to complete.

Present Dyspnea Scales	Source	Reliability and Validity	Comments	Description of Tool
Functional Performance Inventory (FPI)	Leidy, 1999 Leidy & Knebel, 1999	N=154. Significant correlations between FPI total score and Functional Status Questionnaire (FSQ), Duke Activity Status Index, Bronchitis-Emphysema Symptom Checklist, Basic Need Satisfaction Inventory, and Cantril's Ladder of Life satisfaction. (Leidy, 1999). N=22. Correlated significantly with % of predicted FEV ₁ , 12-MWD, diary data for dyspnea, fatigue and difficulty with activity, and FSQ basic and intermediate activities of daily living (Leidy & Knebel, 1999).	Internally consistent and reproducible. Valid and able to discriminate between patients with severe and moderate levels of perceived severity and activity limitation. Clinically valid	65-item questionnaire; evaluates the COPD patient perception of functional performance across 6 domains of activity: body care, household maintenance, physical exercise, recreation, spiritual activities, and social activities.
Pulmonary Functional Status and Dyspnea Questionnaire (PFSQ)	Lareau, Carrier-Kolman, Janson-Bjerkle & Roos, 1994	Content and initial construct validity supported by clinical experts and findings related to expected theoretical constructs. Internal consistency reliable.	Can be used clinically and in research studies to assess dyspnea and changes in the functional ability of patients with pulmonary disease.	164-item paper and pencil self-administered questionnaire, measuring dyspnea intensity with activities and changes in functional ability related to 79 activities of daily living.
Pulmonary Functional Status and Dyspnea Questionnaire (PFSQ-M)	Lareau, Meek & Roos, 1998	Reliability supported by internal consistency for change with activities, dyspnea with activities and fatigue with activities. Good stability on test-retest scores.	Reliable, valid and responsive to changes in lung function over time.	Modification of the PFSQ to a questionnaire with 40 items.
The Manchester Respiratory Activities of Daily Living Questionnaire	Yohannes, Roomi, Winn & Connolly, 2000 Yohannes, Greenwood & Connolly, 2002	Discriminated between normal subjects and those with COPD. Responded to changes following pulmonary rehab. N=188 subjects with COPD and 55 without (Yohannes et al., 2000). Good test-retest reliability (Yohannes et al., 2002).	Reliable and valid self report scale for assessment of physical disability in COPD. Acceptable and repeatable as a postal questionnaire. Authors comment that it has the potential to be used both in hospital practice and follow-up of elderly patients with chronic obstructive airway disease in the community.	Subjects are asked to rate their ability to perform 21 tasks in 4 domains of mobility, in the kitchen, domestic tasks and leisure activities.
AQ20	Hajiro, Nishimura, Jones, Tsukino, Ikeda, Koyama et al., 1999	Significant correlation with St. George's Respiratory Questionnaire and Chronic Respiratory Disease Questionnaire, for improvement following therapy.	Conclude that it may be useful in studies with limited time for health related quality of life assessments.	20-item questionnaire. Authors comment that it should take 2 minutes to complete.
London Chest Activity of Daily Living (LCADL) Scale	Garrod, Bestall, Paul, Wedzicha & Jones, 2000 Garrod, Paul & Wedzicha, 2002	High internal consistency, significant correlations with St. George's respiratory questionnaire activity and impact components; significant relationship with Shuttle walk test. Test-retest in pulmonary rehab; scores showed significant relationship with one another, as well as significant improvement with rehab. N=59.	Conclude that the LCADL as an outcome measure in COPD is reliable, valid and responsive to change.	15-item questionnaire with questions in 4 domains of self-care, domestic, physical and leisure and 1 general question.

Present Dyspnea Scales	Source	Reliability and Validity	Comments	Description of Tool
The St. George's Respiratory Questionnaire	Hajiro et al., 1998	Internal consistency high, significant correlation between SGRQ and CRQ.	Has been used for research. Clinical use not reported.	Self, face to face or telephone interview guide with 76 items in 3 domains of symptoms, activity and impacts. Takes 10 minutes to complete.
Pulmonary Function Status Scale (PFSS)	Weaver, Narsavage & Guilfoyle, 1998	Significant correlation with Sickness Impact Profile and 12 min. walk test, and significant test-retest correlation coefficient.	Concludes that the PFSS has solid psychometric properties that make it acceptable for use in clinical practice as well as research.	53-item self-administered questionnaire with 3 domains of daily activities/social functioning, psychological functioning, and sexual functioning. Reported to take 15-20 minutes to complete.
University of Cincinnati Dyspnea Questionnaire	Lee, Friesen, Lambert & Loudon, 1998	High internal consistency. Sections highly correlated but provide separate and distinct information.	Concludes that questionnaire may be particularly useful for assessing patients who rely extensively on speaking ability for their livelihood.	30-item questionnaire with questions in 3 sections: breathlessness with physical activity, breathlessness with speaking activity, and breathlessness when speaking during a physical activity. May be self or interviewer administered.

Appendix G: Sample COPD Assessment Form

CHRONIC OBSTRUCTIVE PULMONARY DISEASE CLINIC

RETURN VISIT

NAME _____ Cr# _____ Date _____

ALLERGIES

Medication:	Environmental:

CLINICAL EXAMINATION

BP _____ Resting HR _____ Weight _____ Recent Weight Loss _____ O₂ Sat _____

Home O₂: _____ L/min at rest; _____ L/min with activity; Hrs/Day _____

General Appearance: _____

Breath Sounds: _____

Accessory muscles: _____ Air gulping: _____ Apical breathing: _____ Diaphragmatic: _____

Intercostal indrawing: _____ Lateral costal: _____ Paradoxical: _____ Pursed lip: _____

Chest wall appearance/Chest wall mobility: _____

Heart Sounds: _____

JVP: _____

Central cyanosis: _____

Peripheral cyanosis: _____

Peripheral edema: _____

Clubbing of fingernails: _____

PULMONARY FUNCTION TESTS

	Pre-bronchodilator	Post-bronchodilator
FEV ₁ (%) predicted of normal value		
Severity of Disease: (Gold, 2001)		
% Predicted FEV ₁		
Stage I (mild- ≥ 80%)		
Stage II (moderate- 30-80%)		
Stage III (severe- <30%)		
FEV ₁ /FVC (%) predicted of normal value		
Diffusion		

SYMPTOMS

Cough: _____ Sputum: _____ Wheezing: _____

Dyspnea: _____ MRC Score: _____

Grade I (Shortness of breath [SOB] with strenuous exercise)

Grade II (SOB hurrying on level or up slight hill)

Grade III (SOB on level, stop for breath when walking at own pace on level)

Grade IV (Stop for breath after walking 100 yards or after a few minutes on level)

Grade V (Too breathless to leave the house)

Other: _____

# Exacerbations/respiratory infections since last appointment: _____ Dates: _____ _____ _____	# ER visits since last appointment: COPD: Other:
# Admissions since last appointment: COPD: Other: LOS:	# Family Dr. visits since last appointment: Scheduled: Unscheduled:
ICU admissions since last appointment:	Intubations since last appointment:

Diet: Appetite: Fluid Intake: Information given:	Exercise: Present _____ Pulmonary Rehabilitation _____ Information given:
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MEDICATIONS

Prescription:	
	Herbals:
	Over the Counter (OTC):
Influenza Vaccination- Date:	Pneumococcal Vaccination- Date:

INTERVENTIONS

Device Demonstration:
Return Demonstration:
Smoking Cessation Counselling: Information given:
Education: Disease/disease process Medications/devices Signs and symptoms of infection Development of Action Plan Breathing techniques Coughing techniques Oxygen therapy End-of-life decision-making Other:
Sample medications sent with patient:
Drug Plan: Insurer:
Drug Store: Telephone:

PLAN OF CARE

Referrals: Respirologist O ₂ Assessment Education Centre Pulmonary Rehabilitation Access Centre Dietitian Social Worker Psychologist
Other:
Signature:

**COPD Clinic & Education Centre
Initial Visit**

Family Physician _____ Marital Status _____ Age _____ Date _____
 Respiriologist _____ Support System _____
 Living Accommodations: _____
 Community Resources: _____

ALLERGIES

Medication:	Environmental:

CLINICAL EXAMINATION

BP _____ Resting HR _____ Weight _____ Recent Weight Loss _____ O₂ Sat _____
 Home O₂: _____ L/min at rest; _____ L/min with activity; Hrs/Day _____
 General Appearance: _____
 Breath Sounds: _____
 Accessory muscles: _____ Air gulping: _____ Apical breathing: _____ Diaphragmatic: _____
 Intercostal indrawing: _____ Lateral costal: _____ Paradoxical: _____ Pursed lip: _____
 Chest wall appearance/Chest wall mobility: _____
 Heart Sounds: _____
 JVP: _____
 Central cyanosis: _____
 Peripheral cyanosis: _____
 Peripheral edema: _____
 Clubbing of fingernails: _____

PULMONARY FUNCTION TESTS

	Pre-bronchodilator	Post-bronchodilator
FEV ₁ (%) predicted of normal value		
Severity of Disease: (Gold, 2001)		
% Predicted FEV ₁		
Stage I (mild- > 80%)		
Stage II (moderate- 30-80%)		
Stage III (severe- <30%)		
FEV ₁ /FVC (%) predicted of normal value		
Diffusion		

HISTORY

Cough: Frequency: Duration: Productive:	Wheezing: Frequency: Diurnal Pattern: Precipitating Factors:
Sputum: Colour: Amount:	Dyspnea: Frequency: Diurnal Pattern: Precipitating Factors: # Pillows _____ MRC Score: Grade I (SOB with strenuous exercise) Grade II (SOB hurrying on level or up slight hill) Grade III (SOB on level, stop for breath when walking at own pace on level) Grade IV (Stop for breath after walking 100 yards or after a few minutes on level) Grade V (Too breathless to leave the house)
Panic Attacks: Frequency:	Ability to perform ADLs:
Acute Respiratory Infections: Frequency: Timing: Symptoms: Antibiotics: Systemic Corticosteroids:	Other:
Environmental Exposure: Work: Second-Hand Smoke: Other:	Smoking History: Current: Amount: Cessation: When: # of Attempts: ____ Duration: ____ # Package Years:

Nursing Best Practice Guideline

# Exacerbations/respiratory infections in past 12 months: _____ Dates: _____ _____ _____	# ER visits in past 12 months: COPD: Other:
# Admissions in past 12 months: COPD: Other: LOS:	# Family Dr. visits in past 12 months: Scheduled: Unscheduled:
# ICU Admissions:	# Intubations:
Diet: Appetite: Fluid Intake: Information given:	Exercise: Present _____ Previous Pulmonary Rehabilitation _____ Date _____ Information given:

MEDICATIONS

Prescription:	
Influenza Vaccination- Date:	Pneumococcal Vaccination- Date:

PAST MEDICAL HISTORY

Family History:	Mother:	Smoker:
	Father:	Smoker:
	Siblings:	Smoker:
Childhood:	Exposure to ETS (environmental tobacco smoke) as child:	
Adult: Medical:	Asthma: Hypertension: Cardiac: Post Nasal Drip: Other:	Pneumonia: Diabetes: Gastrointestinal: Sinusitis:
Surgical:		
Psychiatric:		
Other:		

INTERVENTIONS

Device Demonstration:
Return Demonstration:
Smoking Cessation Counseling: Information given:
Education: Disease/disease process Medications/devices Signs and symptoms of infection Development of Action Plan Breathing techniques Coughing techniques Oxygen therapy End-of-life decision-making Other:
Sample medications sent with patient:
Drug Plan: Insurer:
Drug Store: Telephone:

Appendix H: Secretion Clearance Techniques – How to Teach Secretion Clearance

Secretion clearance consists of deep breathing, controlled coughing and huffing.

Deep breathing: Do deep breathing exercises 4 to 5 times a day, sitting or standing.

- Relax your shoulders.
- Take a deep breath in through your nose.
- Breathe out slowly through your nose.
- Breathe out longer than you breathe in.
Count to 1 when you breathe in.
Count to 3 when you breathe out.
- Repeat 5 deep breaths as above and rest.
- Try 5 more deep breaths in and out and rest.

Try blowing the air out through pursed-lips. Shape your lips like you are going to whistle, then blow out slowly. This will help you breathe easier.

Controlled Coughing Controlled coughing should be done after each set of breathing exercises:

- Take a deep breath in.
- Cough deeply 2 times with your mouth slightly open.
- Follow each set of breathing exercises with 2 controlled coughs.

Huffing If it is hard for you to cough, try huffing:

- Take a medium breath in.
- Make a sound like “ha” to push the air out very fast with your mouth slightly open.
- Do this 3 to 4 times, and then cough.

Reprinted with permission: Paula Eyles, CNS, Patient Education, St. Joseph's Hospital.

Physiotherapy Department, St. Joseph's Hospital (1997). *Tender loving care for your lungs*. Hamilton, Ontario: St. Joseph's Hospital.

Appendix I: Energy Conservation Tips

Energy Conservation means avoiding fatigue by finding the easiest ways of doing your work, and achieving a good balance between work and rest.

General Principles of Energy Conservation:

Pacing:

- Balance activities and rest
- Steady work = decreasing efficiency
- Periodic breaks = maintained efficiency
- Rest following meals
- Use slow rhythmic movements

Planning:

- Time management is important
- Develop a healthy schedule

Prioritizing:

- Set priorities
- Eliminate unnecessary tasks

Posture:

- Make correct use of your body in all tasks
- Keep your work within easy range
- Change positions frequently
- Make sure your work is at the proper height

Proficiency:

- Organization is essential
- Use equipment that is best suited to the job, and which requires the least amount of work

Ways to Conserve Energy:

1. **Control Your Breathing:** Use breathing control during activities to help reduce shortness of breath and fatigue. Exhale during the strenuous part of an activity and use pursed-lip and diaphragmatic breathing.
2. **Eliminate Unnecessary Activities:** For instance, use a terry robe after showering to avoid the work of drying yourself, and allow dishes to air dry after washing.

Sit for as many activities as possible. Sitting uses 25% less energy than standing.

3. **Get Assistance:** Don't be afraid to ask for assistance when necessary. Some jobs may be too difficult to do alone. Or, there may be a task that you dislike doing, and which someone else may enjoy doing for you. Asking for help does not mean you are dependent; it means you are using your energy to its best advantage.

4. **Organize Your Time:** Plan daily and weekly schedules so you are doing the most energy-consuming activities at the time of day or time of week when you have the most energy. Alternate difficult and easy tasks. Take planned rest periods. Keep your schedule flexible and allow for the unexpected.
5. **Organize Your Methods:** Repetition of new methods will allow things to become automatic, and the more proficient you are, the more energy you save.
6. **Organize Your Space:** Organize your most used items in drawers or shelves that are between waist and shoulder level, so you won't have to stoop or stretch to reach them. Keep items in the area in which they are used, in order to avoid unnecessary walking and carrying.
7. **Pace Yourself:** A slow, steady pace consumes less energy. Do one activity at a time and use slow, smooth movements. Rushing only increases discomfort.

Be certain to alternate periods of work and rest. Try to plan out your activities in steps, so if you start to get short of breath you can stop and rest when necessary, instead of working faster and harder in order to finish.

8. **Maintain a Good Posture:** One of the easiest ways to save energy is to use your body properly. When the body is in proper alignment, less effort is required to maintain that posture.

Avoid bending.

Avoid lifting. Push, pull or slide instead. If you must lift and carry, lift with your legs, use both hands and carry close to your body.

Be certain to choose a work height whereby you can maintain good posture and eliminate strain from any segment of the body. Experimenting at different heights by adjusting either the height of the chair or the work surface is the best method of deciding which height is the most comfortable.

9. **Relax:** Relaxation can help restore energy. Sit in a comfortable chair with your back supported, shoulders relaxed, arms resting in your lap with elbows slightly bent and palms up and feet flat on the floor. Concentrate on relaxing your muscles and slowing down your breathing. Remember: tension only uses energy!
10. **Use Proper Equipment:** Use the right tool to do the job. For example, use long-handled equipment to avoid reaching or bending, use equipment to stabilize items in order to avoid holding, and use trolleys or bundle buggies to do your carrying.

Reprinted with permission: Canadian Lung Association.

Reference: The Lung Association (2005a). Breathe Easy – Management of COPD: Coping strategies, conserve your energy. Lung Association [Electronic version]. Available: <http://www.lung.ca/copd/management/coping/energy.html>

Appendix J: Breathing and Relaxation Techniques

Control Your Breathing

Remember: Breathlessness on effort is uncomfortable but not in itself harmful or dangerous.

Knowing how to control your breathing will help you to remain calm when you are short of breath. Pursed-lip breathing and diaphragmatic breathing will both help if you have COPD. These breathing methods prevent or reduce the trapped air in your lungs, and allow you to inhale more fresh air.

Pursed-Lip Breathing

- Breathe in slowly through your nose for 1 count.
- Purse your lips as if you were going to whistle.
- Breathe out gently through pursed lips for 2 slow counts (exhale twice as slowly as you inhale) - let the air escape naturally and don't force the air out of your lungs.
- Keep doing pursed lip breathing until you are not short of breath.

Diaphragmatic Breathing

- Put one hand on your upper chest, and the other on your abdomen just above your waist.
- Breathe in slowly through your nose – you should be able to feel the hand on your abdomen moving out (the hand on your chest shouldn't move).
- Breathe out slowly through your pursed lips – you should be able to feel the hand on your abdomen moving in as you exhale.

Positions to Reduce Shortness of Breath

1. **Sitting:** Sit with your back against the back of the chair. Your head and shoulders should be rolled forward and relaxed downwards. Rest your hands and forearms on your thighs, palms turned upwards. DO NOT LEAN ON YOUR HANDS. Your feet should be on the floor, knees rolled slightly outwards. Do S.O.S. for S.O.B. until breathing is normal.
2. **Sitting:** Lean back into the chair in a slouched position, your head rolled forward, shoulders relaxed downward. Rest your hands gently on your stomach. Keep your feet on floor, knees rolled outward. Do S.O.S. for S.O.B. until breathing is normal.
3. **Sitting:** Place a pillow on a table and sit down, arms folded and resting on the pillow. Keep your feet on the floor or a stool, and rest your head on your arms. Do S.O.S. for S.O.B. until breathing is normal.

This position may also be used standing, arms resting on kitchen counter or back of chair, NOT LEANING, knees bent slightly, one foot in front of the other.

4. **Standing:** Lean with your back to the wall, a pole, etc. Place your feet slightly apart and at a comfortable distance from the wall, head and shoulders relaxed. Do S.O.S. for S.O.B. until breathing is normal.

S.O.S. for S.O.B. (Help for Shortness of Breath)

When on the brink.....think

- Stop and rest in a comfortable position.
- Get your head down.
- Get your shoulders down.
- Breathe in through your mouth.
- Blow out through your mouth.
- Breathe in and blow out as fast as is necessary.
- Begin to blow out longer, but not forcibly – use pursed lips if you find it effective.
- Begin to slow your breathing.
- Begin to breathe through your nose.
- Begin diaphragmatic breathing.
- Stay in position for 5 minutes longer.

Reprinted with permission: Canadian Lung Association

References:

The Lung Association (2005b). Breathe Easy – Management of COPD: Coping strategies, control your breathing. Lung Association [Electronic version]. Available: <http://www.lung.ca/copd/management/coping/breathing.html>

The Lung Association (2005c). Breathe Easy – Management of COPD: Coping strategies, S.O.B. positions. Lung Association [Electronic version]. Available: <http://www.lung.ca/copd/management/coping/positions.html>

The Lung Association (2005d). Breathe Easy – Management of COPD: Coping strategies, S.O.S. for S.O.B. Lung Association [Electronic version]. Available: <http://www.lung.ca/copd/management/coping/sos.html>

Appendix K: Body Mass Index

Body Mass Index (BMI) is a tool for indicating weight status in adults. It is a measure of weight for height. It is appropriate for adults aged 20-65 years whose body size and composition are constant.

How to Find Your BMI? (Refer to the height and weight chart)

1. Mark an X at your height on line A.
2. Mark an X at your weight on line B.
3. Take a ruler and join the two X's.
4. To find your BMI, extend the line to line C.

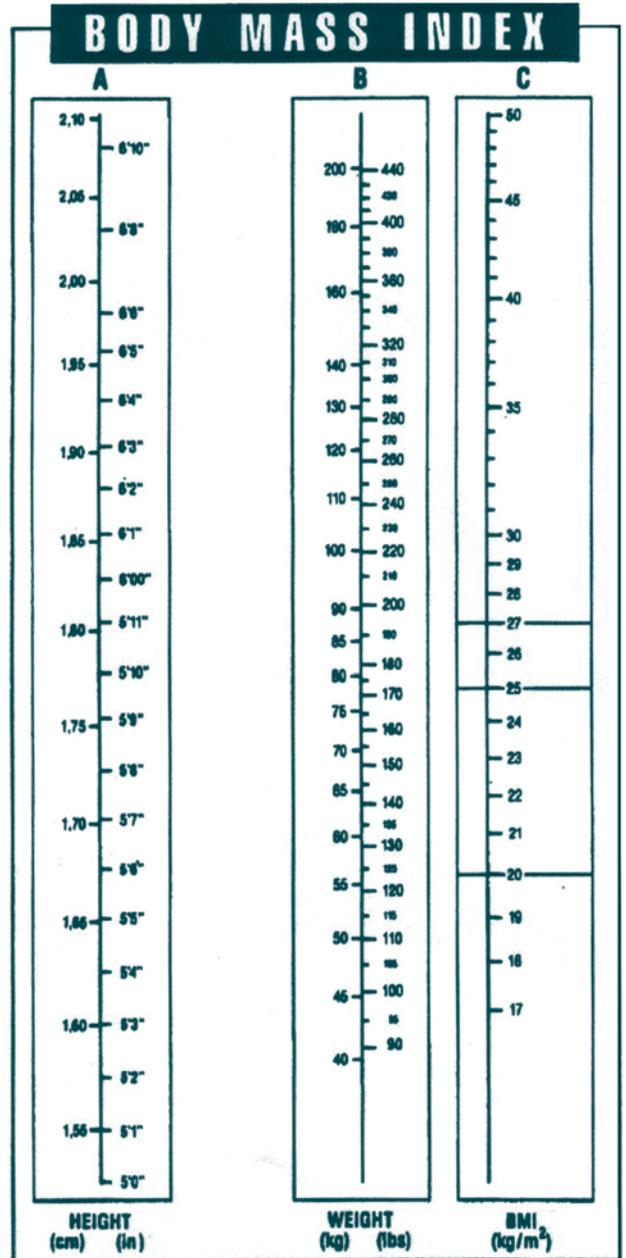
What Does Your BMI Mean?

A BMI between 20-27 means you are within an acceptable healthy weight zone. If you have a big frame (larger bone structure) you will be at the high end of the healthy weight zone. If you have a small frame (small bone structure) you will be at the lower end of the zone. Health problems may occur in some people who have BMIs less than 20 or more than 27. The best way to achieve or maintain a healthy body weight is to participate in regular physical activity and eat a healthy diet.

References:

Centre for Disease Control and Prevention (2004). What is BMI? National Centre for Chronic Disease Prevention and Health Promotion [Electronic version]. Available: <http://www.cdc.gov/nccdphp/dnpa/bmi/bmi-adult.htm>

Physical Activity Promotion Program, Healthy Lifestyles Branch (1998). *Are you at a healthy body weight?* Hamilton, Ontario: Hamilton-Wentworth Regional Public Health Department.



Source: Expert Group on Weight Standards, Health and Welfare Canada

Appendix L: COPD Medications

The following table provides a comparison of COPD medications, their actions, side effects, pharmacokinetics and nursing considerations. It does not include all generic and brand names of COPD medication, but includes the majority of commonly used medications for COPD management.

Bronchodilators		Nursing Considerations	
Medications	Actions	Side Effects	Pharmacokinetics
Short acting β_2 agonists:			
salbutamol <ul style="list-style-type: none"> Airomir® MDI (HFA) 100 µg Ratio-Salbutamol® MDI (HFA) 100 µg Alti-Salbutamol® MDI (HFA) 100 µg Ventolin® Diskus® PD 200 µg Ventolin® MDI (HFA) 100 µg Ventolin® Nebuamp® Wet Nebulization 1.25 or 2.5 mg 	<ul style="list-style-type: none"> Promotes bronchodilation through stimulation of β_2-adrenergic receptors thereby relaxing airway smooth muscle <p>Onset of action: a few minutes Peaks: 15-20 minutes Duration: 2-4 hours, fenoterol up to 8 hours</p>	<ul style="list-style-type: none"> tremor tachycardia headache nervousness palpitations insomnia 	salbutamol Absorption: 20% inhaled, well absorbed (PO) Distribution: 30% inhaled, crosses blood-brain barrier, crosses placenta Metabolism: liver extensively, tissues Excretion: mostly urine, feces, breast milk Half-Life: 4-6 hrs terbutaline Absorption: partially absorbed (PO), minimal (inhalation) Distribution: crosses placenta Metabolism: liver, gut wall Excretion: bile, feces, urine, breast milk Half-Life: unknown fenoterol Absorption: inhalation, minimal; incomplete PO Distribution: unknown Metabolism: liver, 90% Excretion: breast milk, kidney 12% Half-Life: 7 hours formoterol Absorption: rapid, lung deposition 21-37% Distribution: plasma protein binding approximately 50% Metabolism: liver, extensive Excretion: 10% unchanged in urine Half-Life: approximately 8-10 hours
terbutaline <ul style="list-style-type: none"> Bricanyl® Turbuhaler® PD 500 µg 			
fenoterol <ul style="list-style-type: none"> Berotec® MDI 100 µg Berotec® vials Wet Nebulization 0.25 mg/ml, 0.625 mg/ml 			
formoterol <ul style="list-style-type: none"> Oxeze® Turbuhaler® PD 6 µg and 12 µg Foradil® PD 12 µg 			

Medications	Actions	Side Effects	Pharmacokinetics	Nursing Considerations
Anticholinergic				
<p>ipratropium bromide</p> <ul style="list-style-type: none"> • Atrovent® MDI 20 µg • Atrovent® Wet Nebulization 125 µg/ml and 250 µg/ml <p>tiotropium bromide</p> <ul style="list-style-type: none"> • Spiriva for oral inhalation only • 18 µg tiotropium light green capsule • HandiHaler is an inhalation device used to inhale the dry powder contained in the capsule 	<ul style="list-style-type: none"> • An anticholinergic drug that has been shown to have bronchodilator properties • Reduces vagal tone to the airways <p>Onset of action: 5-15 minutes Peaks: 1-2 hours Duration: 4-5 hours</p> <ul style="list-style-type: none"> • An anticholinergic drug that inhibits M3-receptors at the smooth muscle leading to bronchodilation <p>Onset of action: 30 minutes Peaks: 1-4 hours Duration: 24 hours Half Life: 5-7 days</p>	<ul style="list-style-type: none"> • dry mouth • bad taste • tremor <ul style="list-style-type: none"> • dry mouth • constipation • ↑ heart rate • blurred vision • urinary retention • glaucoma 	<p>ipratropium bromide</p> <p>Absorption: minimal Distribution: does not cross blood-brain barrier Metabolism: liver, minimal Excretion: urine feces Half-Life: 3-5 hrs</p> <p>tiotropium bromide</p> <p>Absorption: highly bioavailable in the lung, poorly absorbed from the GI tract Distribution: does not cross blood-brain barrier Metabolism: liver, minimal Excretion: urine feces Half-Life: 5-7 days</p>	<p>Avoid contact with eyes.</p> <p>Use a holding chamber.</p> <p>Contraindicated in patients with hypersensitivity to atropine or its derivatives or lactose monohydrate.</p> <p>Administer at the same time each day.</p> <p>Capsules sensitive to light and moisture.</p> <p>Avoid contact with eyes.</p>
Methylxanthine:				
<p>aminophylline</p> <ul style="list-style-type: none"> • Phyllocontin SRT <p>theophylline</p> <ul style="list-style-type: none"> • Apo-Theo-LA SRT • Novo-Theophyl SRT • Quibron-T® • Theochron SRT • Theolair SRT <p>24-Hour: theophyllin</p> <ul style="list-style-type: none"> • Uniphyll 	<ul style="list-style-type: none"> • Relaxes airway smooth muscle • May have some anti-inflammatory effect • Patients may benefit even when serum levels are low 	<ul style="list-style-type: none"> • Usually caused by a high drug serum concentration or the patient's inability to tolerate the drug and include: <ul style="list-style-type: none"> • upset stomach • with heartburn • nausea • diarrhea • loss of appetite • headaches • nervousness • insomnia • tachycardia • seizures 	<p>theophylline</p> <p>Absorption: well absorbed (PO), slowly absorbed (extended release) Distribution: crosses placenta, widely distributed Metabolism: liver Excretion: kidneys, breast milk Half-Life: 3-13 hrs, increased in liver disease, CHF and elderly; decreased in smokers</p> <p>Several drug interactions include:</p> <ul style="list-style-type: none"> • antibiotics <p>Therapeutic Range: 29-55 umol/L</p>	<p>Take with food or after meals.</p> <p>Monitor blood serum.</p>

Medications	Actions	Side Effects	Pharmacokinetics	Nursing Considerations
Inhaled/Oral Steroids Glucocorticosteroids (inhaled) beclomethasone <ul style="list-style-type: none"> • Alti-beclomethasone® MDI (CFC) 50µg • QVAR® MDI(HFA) 50 µg, 100 µg 	<ul style="list-style-type: none"> • Prevents and suppresses activation and migration of inflammatory cells • Reduces airway swelling, mucus production, and microvascular leakage • Increases responsiveness of smooth muscle beta receptors 	Inhaled route <ul style="list-style-type: none"> • sore throat • hoarse voice • thrush 	beclomethasone Absorption: 20% Distribution: 10-25% in airways (no spacer) Metabolism: minimal Excretion: less than 10% in urine/feces Half-Life: 15 hrs	Rinsing, gargling and expectorating after inhalation can minimize these side effects. A spacer should be used with MDIs to reduce side effects. Assess denture fit to avoid thrush. Rinse mouth, also prior to reinsertion of dentures. May irritate gum line and medication deposits may accumulate in improper fitting dentures. Promote good dental hygiene.
budesonide <ul style="list-style-type: none"> • Pulmicort® Nebuamp® Wet Nebulization 0.125 mg/ml, 0.25 mg/ml and 0.5 mg/ml • Pulmicort® Turbuhaler® PDI100 µg, 200 µg, and 400 µg 			budesonide Absorption: 39% Distribution: 10-25% in airways (no spacer) Metabolism: liver Excretion: 60% urine, smaller amounts in feces Half-Life: 2-3 hrs	
fluticasone <ul style="list-style-type: none"> • Flovent® Diskus® PD 50 µg, 100 µg, 250 µg, and 500 µg • Flovent® MDI(HFA) 50 µg, 125 µg, and 250 µg 			fluticasone Absorption: 30% aerosol, 13.5% powder Distribution: 10-25% in airways (no spacer), 91% protein binding Metabolism: liver Excretion: less than 5% in urine, 97-100% in feces Half-Life: 14 hrs	Assess baseline bone density. Dietary education (calcium, protein) Promote eye/dental health and regular eye/teeth examinations. Monitor glucose level. Skin care education re: dry, thin, bruising. Avoid use of adhesive bandages. Use Vitamin E lotion.
Glucocorticosteroids (oral): prednisone <ul style="list-style-type: none"> • Prednisone 5 mg and 50 mg tablets • Deltasone® 5 mg and 50mg tablets 		Oral or IV route-short term (less than 2 weeks): <ul style="list-style-type: none"> • weight gain • increased appetite • mood changes • easy bruising • muscle cramps • mild reversible acne 	prednisone Absorption: well absorbed Distribution: widely distributed; crosses placenta Metabolism: liver; extensively Excretion: urine, breast milk Half-Life: 3-4 hrs	
methylprednisolone <ul style="list-style-type: none"> • Medrol® 4 mg tablets and 16 mg tablets 		Oral route-long term (more than 2 weeks): <ul style="list-style-type: none"> • adrenal suppression • immuno-suppression • osteoporosis • hyperglycemia • hypertension • weight gain • cataracts • glaucoma • peptic ulcer • ecchymosis • avascular necrosis of the hip 	IV steroids: Absorption: rapid Distribution: widely distributed Metabolism: liver Excretion: urine Half-Life: 18 to 36 hrs, depending on the drug	
Corticosteroids (intravenous): methylprednisolone SoluCortef® SoluMedrol®				

Medications	Actions	Side Effects	Pharmacokinetics	Nursing Considerations
<p>Long-Acting β_2 agonists:</p> <p>formoterol</p> <ul style="list-style-type: none"> Oxeze® Turbuhaler® PD 6 µg and 12 µg Foradil® PD 12 µg <p>salmeterol</p> <ul style="list-style-type: none"> Serevent® Diskus® PD 50 µg Serevent® MDI (HFA) 25 µg 	<ul style="list-style-type: none"> Promotes bronchodilation through stimulation of β_2-adrenergic receptors thereby relaxing airway smooth muscle <p>formoterol Onset of action: 1-3 minutes Duration: 12 hours</p> <p>salmeterol Onset of action: 10-20 minutes Duration: 12 hours</p>	<ul style="list-style-type: none"> tremor tachycardia headache nervousness palpitations insomnia 	<p>formoterol Absorption: rapid, lung deposition 21-37% Distribution: plasma protein binding approximately 50% Metabolism: liver, extensive Excretion: 10% unchanged in urine Half-Life: approximately 8-10 hours</p> <p>salmeterol Absorption: minimal systemic Distribution: local Metabolism: liver first pass Excretion: unknown Half-Life: 5.5 hrs</p>	
<p>Combination Drugs:</p> <p>Two bronchodilators:</p> <p>ipratropium bromide and salbutamol</p> <ul style="list-style-type: none"> Combivent MDI 20 µg ipratropium/120 µg salbutamol Combivent Wet Nebulization 0.5mg ipratropium/3 mg salbutamol per 2.5 ml vial <p>Long-acting bronchodilators and inhaled steroids:</p> <p>budesonide and formoterol</p> <ul style="list-style-type: none"> Symbicort® Turbuhaler® PD 100/6 µg, 200/6 µg <p>fluticasone and salmeterol</p> <ul style="list-style-type: none"> Advair® Diskus® PD 100/50 µg, 250/50 µg, 500/50 µg Advair® MDI (HFA) 125/25 µg, 250/25 µg 	<ul style="list-style-type: none"> the same as those listed for each medication separately 			<p>Rinse mouth due to dryness.</p> <p>Rinse mouth post-inhalation to prevent thrush.</p>

Antibiotics

Medications	Actions	Side Effects	Pharmacokinetics	Nursing Considerations
Macrolides/Anti-infectives telithromycin (Ketek) <ul style="list-style-type: none"> PO (2) 400 mg tablets taken together as one dose, once a day for 5 or 10 days 	<ul style="list-style-type: none"> Inhibits protein synthesis by binding to 50S ribosomal subunits 	<ul style="list-style-type: none"> diarrhea blurred vision allergic reaction nausea vomiting headache vaginitis 	<p>Absorption: rapidly absorbed Distribution: widely distributed Metabolism: liver Excretion: urine, feces Half-Life: 2-3 hrs</p>	<p>Be aware whether the antibiotic the patient is prescribed is to be taken with or without food.</p>
clarithromycin (Biaxin) <ul style="list-style-type: none"> PO 250-500 mg bid x 7-14 days 	<ul style="list-style-type: none"> Binds to 50S ribosomal subunits of susceptible bacteria and suppresses protein synthesis 	<ul style="list-style-type: none"> hepatotoxicity dizziness headache nausea diarrhea constipation 	<p>Absorption: 50% Distribution: widely distributed Metabolism: liver Excretion: kidneys unchanged (20%-30%) Half-Life: 4-6 hrs</p>	<p>Determine if the patient has a sensitivity or allergy to the prescribed medication.</p>
azithromycin (Zithromax) <ul style="list-style-type: none"> PO 500 mg on day 1 then 250mg qd on days 2-5 for a total dose of 1.5 g IV 500 mg qd > 2 days then 250 mg qd to complete 7-10 day therapy (community acquired pneumonia) 	<ul style="list-style-type: none"> Binds to 50S ribosomal subunits of susceptible bacteria and suppresses protein synthesis, much greater spectrum of activity than erythromycin 	<ul style="list-style-type: none"> palpitations chest pain dizziness headache tremors nausea diarrhea hepatotoxicity 	<p>Absorption: rapid, (PO) up to 50% Distribution: widely distributed Metabolism: unknown, minimal metabolism Excretion: unchanged (bile); kidneys, minimal Half-Life: 11-70 hrs</p>	
erythromycin <ul style="list-style-type: none"> PO 250-500 mg q6h (base, estolate, state), PO 400-800 mg q6h (ethylsuccinate) IV inf 15-20 mg/kg/day (lactobionate) divided q6h 	<ul style="list-style-type: none"> Binds to 50S ribosomal subunits of susceptible bacteria and suppresses protein synthesis 	<ul style="list-style-type: none"> anaphylaxis dysrhythmias vaginitis nausea vomiting diarrhea 	<p>Absorption: well absorbed (PO), minimally absorbed (topically, ophthalmic) Distribution: widely distributed; minimally distributed (CSF); crosses placenta Metabolism: liver partially Excretion: unchanged (bile); kidneys, minimal unchanged Half-Life: 1-3hrs</p>	
Amoxicillin (Amoxil) <ul style="list-style-type: none"> PO 750 mg-1.5g qd in divided doses q8h 	<ul style="list-style-type: none"> Interfers with cell wall replication of susceptible organisms by binding to the bacterial cell wall, the cell wall, rendered osmotically unstable, swells and bursts from osmotic pressure 	<ul style="list-style-type: none"> anaphylaxis anemia urticaria bone marrow depression dizziness headache fever nausea diarrhea 	<p>Absorption: well absorbed (90%) Distribution: readily in body tissues, fluids, CSF; crosses placenta Metabolism: liver (30%) Excretion: breast milk, kidneys, unchanged (70%) Half-Life: 1-1.3hrs</p>	

Medications	Actions	Side Effects	Pharmacokinetics	Nursing Considerations
Macrolides/Anti-infectives doxycycline (Doxy, Doxycin) <ul style="list-style-type: none"> PO/IV 100 mg q12h on day 1 then 100 mg/day; IV 200 mg in 1-2 infusion on day 1 then 100-200 mg/day ciprofloxacin (Cipro) <ul style="list-style-type: none"> For respiratory infections PO 500 mg q12h 	<ul style="list-style-type: none"> Inhibits protein synthesis, phosphorylation in microorganisms by binding to 30S ribosomal subunits, reversibly binding to 50S ribosomal subunits, bacteriostatic Interferes with conversion of intermediate DNA fragments into high-molecular-weight DNA in bacteria; DNA gyrase inhibitor 	<ul style="list-style-type: none"> vomiting fever diarrhea pericarditis increased BUN hemolytic anemia headache dizziness nausea rash vomiting diarrhea 	<p>Absorption: well absorbed Distribution: widely distributed; crosses placenta Metabolism: some hepatic recycling Excretion: bile, feces, kidneys, unchanged (20%-40%) Half-Life: 15-22 hours; increased in severe renal disease.</p> <p>Absorption: well absorbed (75%) (PO) Distribution: widely distributed Metabolism: liver (15%) Excretion: kidneys (40-50%) Half-Life: 3-4 hr; increased in renal disease</p>	<p>Monitor for Achilles Tendinitis</p>
Psychotropics bupirone (BuSpar) <ul style="list-style-type: none"> PO 5 mg tid; may increase by 5 mg/day q2-3 days not to exceed 60 mg/day chlorpromazine (Chlorpromanyl) <ul style="list-style-type: none"> PO 10-50 mg q1-4h initially then increase up to 2 g/day if necessary IM 10-50 mg q1-4h In elderly, use lowest effective dose 	<ul style="list-style-type: none"> Acts by inhibiting the action of serotonin by binding to serotonin and dopamine receptors also increases norepinephrine metabolism Depresses cerebral cortex, hypothalamus, limbic system, which control activity aggression, blocks neurotransmission produced by dopamine at synapse, exhibits a strong alpha-adrenergic, anticholinergic blocking action, mechanism for antipsychotic effects is unclear. 	<ul style="list-style-type: none"> hyperventilation chest congestion shortness of breath tachycardia palpitations hypertension hypotension dizziness headache tremors nausea diarrhea constipation respiratory depression dyspnea laryngospasm cardiac arrest orthostatic hypotension tachycardia headache akathisia dystonia 	<p>Absorption: rapidly absorbed Distribution: unknown Metabolism: liver extensively Excretion: feces Half-Life: 2-3 hours</p> <p>Absorption: variable PO, well absorbed IM Distribution: widely distributed; crosses placenta Metabolism: liver, GI mucosa extensively Excretion: kidneys Half-Life: 30 hours</p>	

Opioids

Medications	Actions	Side Effects	Pharmacokinetics	Nursing Considerations
Opioid Analgesics Morphine (Morphine sulfate) <ul style="list-style-type: none"> • SC/IM 4-15 mg q4h prn • PO 10-30 mg q4h prn; ext rel q8-12h; rectal 10-20 mg q4h prn • IV 4-10 mg diluted in 4-5 ml water for injection, over 5 min 	<ul style="list-style-type: none"> • Depresses pain impulse transmission at the spinal cord level by interacting with opioid receptors, produces CNS depression 	<ul style="list-style-type: none"> • constipation • respiratory depression • drowsiness • dizziness • confusion • sedation • bradycardia • hypotension • nausea • vomiting • constipation • urinary retention 	<p>Absorption: variably absorbed (PO); well absorbed (IM, SC, rectally); completely absorbed IV</p> <p>Distribution: widely distributed, crosses placenta</p> <p>Metabolism: liver extensively</p> <p>Excretion: kidneys</p> <p>Half-Life: 1.5-2 hours</p>	<p>Nebulized opioids are almost exclusively used in palliative care in patients with end-stage COPD.</p>
hydromorphone (Dilaudid) <ul style="list-style-type: none"> • Antitussive PO 1 mg q3-4h prn • Analgesic PO 2 mg q3-6h prn, may increase to 4 mg q4-6h • SC/IM 1-2 mg q3-6h prn, may increase to 3-4 mg q4-6h • IV 0.5-1mg q3h prn; rec 3 mg q4-8h prn 	<ul style="list-style-type: none"> • Depresses pain impulse transmission at the spinal cord level by interacting with opioid receptors, increases respiratory tract fluid by decreasing surface tension and adhesiveness, which increases removal of mucus, analgesic, antitussive 	<ul style="list-style-type: none"> • respiratory depression • drowsiness • dizziness • confusion • sedation • bradycardia • hypotension • nausea • vomiting • constipation 	<p>Absorption: well absorbed (PO); completely absorbed IV</p> <p>Distribution: unknown, crosses placenta</p> <p>Metabolism: liver extensively</p> <p>Excretion: kidneys</p> <p>Half-Life: 2-3 hours</p>	

Vaccination	Medications	Actions	Side Effects	Pharmacokinetics	Nursing Considerations
<p>Influenza Vaccination</p> <ul style="list-style-type: none"> • 0.5ml IM 	<p>oseltamivir (Tamiflu)</p> <ul style="list-style-type: none"> • PO 75 mg x 5 days begin treatment within 2 days of onset of symptoms 	<ul style="list-style-type: none"> • Inhibits influenza virus neuraminidase with possible alteration of virus particle aggregation and release 	<ul style="list-style-type: none"> • pain and/or erythema at injection site • anaphylaxis • headache • fatigue • nausea • vomiting • diarrhea • cough • abdominal pain 	<p>Absorption: rapidly absorbed Distribution: protein binding is low Metabolism: converted to oseltamivir carboxylate Excretion: eliminated by conversion Half-Life: 1-3 hours</p>	<p>Give injection when not contraindicated (e.g., egg allergy, thimerosal sensitivity)</p>
<p>Pneumo 23 (Pneumococcal Polysaccharide Vaccine)</p> <ul style="list-style-type: none"> • IM/SC immunizing dose is a single injection of 0.5 ml • Revaccination: One injection of 0.5 ml 			<ul style="list-style-type: none"> • pain and/or erythema at the injection site • headache • general malaise • uticaria • anaphylaxis reaction 		<p>Revaccination recommended for high risk patients every 5-10 years.</p>
<p>Pneumovax 23 (Pneumococcal Vaccine)</p> <ul style="list-style-type: none"> • Administer a single 0.5 ml dose of the vaccine SC or IM (preferably in the deltoid muscle or lateral thigh) 			<ul style="list-style-type: none"> • pain and/or erythema at the injection site • headache • low grade fever • anaphylaxis reaction 		

RNAO Guideline Development Panel, 2005

Appendix M: Device Technique

Medications: Inhalation Devices

Medications come in many forms. However, most often they are taken by the inhaled route:

- Metered Dose Inhaler (puffer)
- Dry Powder Inhalers (Turbuhaler®, Diskus®, Diskhaler®, Spiriva®, HandiHaler®)
- Nebulizer

Accurate technique for using these devices is extremely important.

Delivery Device

The inhaled route is the most effective method to deliver the medication directly to the airways. As a result of using the inhaled route, the total dose of medication required is greatly reduced, thereby reducing the chance for the medication to have a systemic effect.

A. Metered Dose Inhalers (MDI)

Metered dose inhalers (MDI), or puffers, deliver a precise dose of medication to the airways when used appropriately. It is very important to have a good technique. A holding chamber or spacer is recommended for use with a MDI, particularly for those not able to use a puffer accurately. To determine whether the puffer is empty: (1) calculate the number of doses used, or (2) invert or shake it close to the ear several times and listen/feel for movement of liquid. One advantage of using the MDI is that it is quite portable. A number of different metered dose inhalers are available. Different pharmaceutical companies manufacture similar medications that are in different inhalers.



Metered Dose Inhaler

Metered Dose Inhaler: Proper Use of a MDI

1. Remove the cap from the mouthpiece and shake the inhaler.
2. Breathe out to the end of a normal breath.
3. a) Position the mouthpiece end of the inhaler about 2-3 finger widths from the mouth, open mouth widely and tilt head back slightly, *OR*
b) Close lips around the mouthpiece and tilt head back slightly.
4. Start to breathe in slowly, and then depress the container once.
5. Continue breathing in slowly until the lungs are full.
6. Once breathing in fully, HOLD breath for 10 seconds or as long as possible, up to 10 seconds.
7. If a second puff is required, wait one minute and repeat the steps.

Care of a Metered Dose Inhaler

Keep the inhaler clean. Once a week, remove the medication canister from the plastic casing and wash the plastic casing in warm, soapy water. When the casing is dry, replace the medication canister in the casing and place the cap on the mouthpiece. Ensure that the hole is clear. Check the expiry date. Check to see how much medication is in the inhaler as described previously.

Holding Chambers/Spacers

A number of different holding chambers are available on the market. Different pharmaceutical companies make different devices. All these devices are effective. The difference between them is the cost and durability.

Holding chambers are devices with one-way valves that hold the medication for a few seconds after it has been released from the inhaler. This allows the individual the advantage of taking in more than one breath for each puff when unable to hold their breath, particularly in an acute episode of dyspnea.



Holding Chamber/Spacer

Key Point

- Holding chambers are indicated for all individuals who use a Metered Dose Inhaler.
- When a holding chamber and inhaler are used, the larger particles drop down into the holding chamber. This limits the amount of particles in the mouth and throat, which in turn limits the amount absorbed systemically.
- Using a holding chamber may prevent a hoarse voice or sore throat which can occur with inhaled steroid use. Whether a holding chamber is used or not, individuals using inhaled steroids should gargle after treatment.

Proper Use of a Holding Chamber with Mouthpiece:

1. Remove the cap on the inhaler (MDI) and holding chamber mouthpiece.
2. Shake the inhaler well immediately before each use. Insert the inhaler (MDI) into the large opening of the inhaler adaptor on the chamber.
3. Exhale normally. This will help the individual to prepare to take in a deep breath. It is best to take the inhaled medication while standing or sitting.
4. Insert mouthpiece between teeth and seal with the lips around the mouthpiece. Do not block the slots on either side of the mouthpiece with lips.
5. Activate canister. Spray one dose of medication into the chamber by squeezing the canister down once between forefinger and thumb.
6. Inspiration should begin no later than 1-3 seconds after actuation of the pump. Once the medication is aerosolized, breathe in slowly and deeply through mouth. Try to take 3 to 5 seconds to inhale completely while the spray remains suspended in the holding chamber for less than 10 seconds. This will open the valve, allowing the drug to leave the spacer. Breathing in too quickly will cause the drug to hit the back of the throat and mouth. With the aerochambers, if a whistling sound is heard, this means that inhaling is occurring too fast and one must slow down.
7. a) Single-breath technique: Hold breath for 5 to 10 seconds. Holding breath will give the medication time to settle in the airways.
b) Tidal volume technique: Breathe slowly in and out of the spacing device, 3 or 4 times in a row.
8. If more than 1 dose is required, wait 30 seconds to 1 minute between puffs and repeat all steps from the beginning.

Proper Use of a Holding Chamber with Mask:

1. Remove the cap from the mouthpiece and shake the inhaler.
2. Place the MDI upright in the holding chamber's back rubber opening.
3. Exhale normally. This will help the individual to prepare to take a deep breath in. It is best to take the inhaled medication while standing or sitting.
4. Place the mask over the face, making sure that the mouth and nose are covered and that the seal is as airtight as possible without undue discomfort.
5. Activate canister. Spray one dose of medication into the chamber by squeezing the canister down once between forefinger and thumb.
6. Inspiration should begin no later than 1-3 seconds after actuation of the pump. Once the medication is aerosolized, breathe in slowly and deeply through mouth. Try to take 3 to 5 seconds to inhale completely while the spray remains suspended in the holding chamber for less than 10 seconds. This will open the valve, allowing the drug to leave the spacer. Breathing in too quickly will cause the drug to hit the back of the throat and mouth. With the aerochambers, if a whistling sound is heard, this means that inhaling is occurring too fast and one must slow down.
7. a) Single-breath technique: Hold breath for 5 to 10 seconds. Holding breath will give the medication time to settle in the airways.
b) Tidal volume technique: Breathe slowly in and out of the spacing device, 3 or 4 times in a row.
8. If another dose is required, repeat steps 2-7. If more than 1 dose is required, wait 30 seconds to 1 minute between puffs and repeat all steps from the beginning.

Care of a Holding Chamber (with/without mask)

Whichever holding chamber is used, it must be cleaned at least once a week with warm soapy water, and air dried.

B. Dry Powder Inhalers (DPIs)

There are several dry powder inhalers available. Examples include the Turbuhaler®, Diskus®, Diskhaler® and the Handihaler®.

Key Point

General points of dry powder inhalers include:

- A quick forceful breath in is required to deliver the medications to the lungs, versus a slow breath for MDIs.
- Some DPIs contain a lactose carrier or filler.

Proper Use of a Turbuhaler®

1. Unscrew the cover and remove it.
2. Holding the device upright, turn the coloured wheel one way (right) and back (left) the other way until it clicks. Once the click is heard, the device is loaded.
3. Breathe out away from the Turbuhaler® mouthpiece.
4. Place the mouthpiece between lips and tilt head back slightly.
5. Breathe in deeply and forcefully.
6. Hold breath for 10 seconds or as long as possible.
7. If a second dose is prescribed, repeat the steps.

When a red mark first appears in the little window, only 20 doses remain. The Turbuhaler® is empty and should be discarded when a red mark reaches the lower edge of the window. Newer Turbuhaler® devices have a counter that appears in a little window to show the number of doses left.



Turbuhaler®

Care of a Turbuhaler®

Clean the mouthpiece two or three times a week. Using a dry cloth, wipe away any particles which have collected on the mouthpiece. Never wash the mouthpiece.

Proper Use of a Diskus®

1. *Open* – Place thumb on thumb grip. Push thumb away from body as far as it will go.
2. *Slide* – Slide the lever until a click is heard. Breathe out away from the diskus.
3. *Inhale* – Seal lips around the mouthpiece. Breathe in steadily and deeply through mouth. Hold breath for about 10 seconds, then breathe out slowly.
4. *Close* – Place thumb on thumb grip, and slide the thumb grip towards body, as far as it will go.



Diskus®

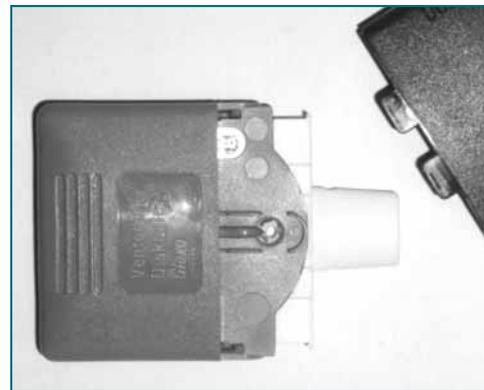
Important: If more than one puff is prescribed, repeat steps 2 – 4. The diskus contains medication in a powdered form for Ventolin[®], Serevent[®] (long acting bronchodilator), Flovent[®] (anti-inflammatory) or Advair[®] (a combination of Serevent[®] and Flovent[®] in one inhaler). Rinse mouth after using Flovent[®] or Advair[®].

Care of a Diskus[®]

The dose counter displays how many doses are left or when the inhaler is empty. Keep the Diskus[®] closed when not in use, and only slide the lever when ready to take a dose.

Proper Use of a Diskhaler[®]

1. To load the Diskhaler[®], remove the cover and cartridge unit.
2. Place a disk on the wheel with the numbers facing up and slide the unit back into the Diskhaler[®].
3. Gently push the cartridge in and out until the number 8 appears in the window
4. The Diskhaler[®] is now ready for use.
5. Raise the lid up as far as it will go - this will pierce the blister.
6. Close the lid.
7. Breathe out.
8. Place the mouthpiece between the teeth and lips – make sure not to cover the air holes at the sides of the mouthpiece.
9. Tilt head back slightly.
10. Breathe in deeply and forcefully.
11. Hold breath for 10 seconds or as long as possible.
12. Sometimes 2 or 3 forceful breaths in are needed to make sure all the medication is taken.
13. If a second blister is prescribed, advance the cartridge to the next number and repeat steps 5-11.



Diskhaler[®]

Care of a Diskhaler[®]

Remove the cartridge and wheel. Clean any remaining powder away using the brush provided in the rear compartment before replacing the cartridge and wheel.

Spiriva® Handihaler®

The HandiHaler® is an inhalation device that has been specially designed for use with SPIRIVA capsules. It must not be used to take any other medications.

The HandiHaler® consists of: (1) Dust cap (2) Mouthpiece (3) Base (4) Piercing button (5) Centre chamber



HandiHaler®

Proper Use of a Spiriva® HandiHaler®:

1. Open the dust cap by pulling it upwards. Then open the mouthpiece.
2. Place the capsule in the centre chamber. It does not matter which way the capsule is placed in the chamber first.
3. Close the mouthpiece firmly until a click is heard, leaving the dust cap open.
4. Hold the HandiHaler® device with the mouthpiece upwards and press the piercing button in once completely, and release. This makes holes in the capsule and allows the medication to be released when breathing in.
5. Breathe out completely. Do not breathe into the mouthpiece at any time.
6. Raise the HandiHaler® device to mouth and close lips tightly around the mouthpiece. Keep head in an upright position and breathe in slowly and deeply but at a rate sufficient to hear the capsule vibrate. Breathe in until lungs are full; then hold breath as long as is comfortable and at the same time take the HandiHaler® device out of the mouth. Resume normal breathing. To ensure full dose of Spiriva® is received, repeat steps 5 and 6 once again.
7. After taking the daily dose of Spiriva®, open the mouthpiece again. Tip out the used capsule and dispose.
8. Close the mouthpiece and dust cap for storage of the HandiHaler® device.

Care of a HandiHaler® Device:

Normally, during a one-month period of use, the HandiHaler® device does not need to be cleaned. However, if cleaning is needed the HandiHaler device can be cleaned as described below:

1. Open the dust cap and mouthpiece. Open the base by lifting the piercing button. Rinse the inhaler completely with warm water to remove any powder. Do not use cleaning agents or detergents.
2. Dry the handiHaler® device thoroughly by tipping the excess water out on a paper towel and air dry afterwards, leaving the dust cap, mouthpiece and base open. It takes 24 hours to air dry, so clean it right after using it and it will be ready for the next dose. Do not use the HandiHaler device when it is wet.
3. If needed, the outside of the mouthpiece may be cleaned with a moist, but not wet tissue.
4. The HandiHaler® device should not be placed in the dishwasher for cleaning.
5. Store Spiriva capsules and the HandiHaler® device at 25° C (77° F); excursions to 15-30° C (59-86° F).

C. Nebulizers (Compressors)

A nebulizer or compressor is used for antibiotics and nebulized opioids. No hand-breath coordination is required. Each treatment requires sitting quietly for 20-30 minutes while the drug is nebulized from a liquid to a mist.

The nebulizer is generally not portable unless it is a 3-way system. The 3-way nebulizer can be plugged into an electrical outlet, has an adaptor for use in a vehicles cigarette lighter, and can be battery operated. Both the 3-way machine and the regular nebulizers are expensive and must be serviced regularly. The inhalers, when used properly, are as effective as using a nebulizer.

Care of Nebulizer and Equipment

Wash mask with hot, soapy water. Rinse well and allow to air dry before re-use.

Reference:

Adapted from: Registered Nurses' Association of Ontario (2003b). *Adult Asthma Care Guidelines for Nurses: Promoting Control of Asthma*. Toronto, Canada: Registered Nurses' Association of Ontario

The Lung Association <http://www.lung.ca/asthma/manage/devices.html>



Appendix N: Plan of Action for Managing Acute Exacerbation of COPD

Sample 1:

Contact List

Service	Name	Phone Number
Respirologist		
Family Physician		
Contact Person		
After 5 p.m. on weekdays/weekends		
Hospital Emergency		
Others:		

I Feel Well

My Symptoms		My Actions	
<ul style="list-style-type: none"> ■ I sleep well and my appetite is good. ■ I am able to do my exercises. 		<ul style="list-style-type: none"> ■ I avoid things that may make my symptoms worse. ■ I plan each day in advance. ■ I take my medication as prescribed by my doctor. ■ I eat healthy food. ■ I do my exercises on a regular basis. 	
My Regular Treatment			
Name of Medication	Dose	Number of Puffs/Pills	Frequency

I Feel Different (environment/stress)

My Symptoms	My Actions
<ul style="list-style-type: none"> ■ I am more short of breath than usual ■ I may have sputum, a cough or a wheeze 	
I have been exposed to . . .	
. . . Stressful Situation	<ul style="list-style-type: none"> ■ I use my breathing techniques and try to relax first. ■ I position my body so I am less short of breath. ■ I take ____ puffs of _____.
. . . Pollutants, Sudden Changes in Temperature, Humidity, Wind or Strong Exercise	<ul style="list-style-type: none"> ■ I take ____ puffs of _____ and repeat each 20 to 45 minutes, for 2 to 3 times. ■ I avoid or decrease exposure to these factors. ■ I use my breathing techniques and try to relax.

I Feel Different (respiratory infection)

I have at Least 2 of the Following Symptoms	My actions			
<ul style="list-style-type: none"> ■ Increased shortness of breath. ■ Increased volume of sputum. ■ Yellow or green sputum 				
I have developed . . .				
. . . a Respiratory Infection	<ul style="list-style-type: none"> <input type="checkbox"/> I increase my inhaled bronchodilators as recommended by my doctor. <input type="checkbox"/> I notify my contact person or doctor for advice. <input type="checkbox"/> I take my antibiotic and my anti-inflammatory as recommended by my doctor. 			
My Additional Treatment is . . .				
Bronchodilators	Dose	#puffs/pills	Frequency	# of days
Antibiotic	Dose	pills	Frequency	# of days
Anti-Inflammatory	Dose	#puffs/pills	Frequency	# of days

My Symptoms Continue to Get Worse

My Symptoms	My Actions
... have not improved or they have become worse	<ul style="list-style-type: none"> ■ I call my contact person. ■ After 5 p.m. or on the weekend, and I am unable to wait, I will go to the hospital or a walk-in clinic.

I Feel I am in Danger

My Symptoms	My Actions
In any situation if: <ul style="list-style-type: none"> ■ I am very short of breath, agitated, confused and/or drowsy. ■ I have chest pain. 	<ul style="list-style-type: none"> ■ I will dial 911 for an ambulance to take me to the nearest hospital emergency
Other Doctor Recommendations	

Reprinted with permission: B. C. Decker, Inc.
 Bourbeau, J., Nault, D., & Borycki, E. (2002). *Comprehensive management of chronic obstructive pulmonary disease*. Hamilton, Ontario: B.C. Decker, Inc.

Sample 2:

Action Plan

CHRONIC OBSTRUCTIVE PULMONARY DISEASE ACTION PLAN	
Name	_____
Family Doctor	_____
Dr's Telephone (day)	_____
Practice Nurse	_____
After Hours	_____
* Every Fall See Your Doctor For An Influenza Vaccination	

ACTION PLAN FOR PEOPLE WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE

WHEN YOU ARE WELL-KNOW THE FOLLOWING	ACTION
<ul style="list-style-type: none"> ■ How much you can do each day ■ How your breathing is at rest and during activity ■ What makes your breathing worse ■ What your appetite is like ■ How well you sleep ■ How much phlegm you have, and its colour 	<ul style="list-style-type: none"> ■ Have something to look forward to each day ■ Plan ahead – allow enough time to do things ■ Exercise every day but pace yourself ■ Eat a balanced diet – drink adequate fluids ■ Avoid factors that make you worse
WORSENING SYMPTOMS	ACTION
<ul style="list-style-type: none"> ■ More breathless or wheezy than usual ■ Reduced energy for daily activities ■ Loss of appetite ■ Increasing tiredness and poor sleep ■ Change in amount and /or colour of phlegm ■ Other 	<ul style="list-style-type: none"> ■ Phone your medical practice and discuss <ol style="list-style-type: none"> 1. Changes in symptoms 2. Temporary assistance for difficult activities 3. Medications ■ Re-schedule your day- allow more time ■ Get plenty of rest and use relaxation techniques ■ Use controlled breathing techniques ■ Huff and cough to clear phlegm ■ Eat small amounts more often ■ Drink adequate fluids
SEVERE SYMPTOMS	ACTION
<ul style="list-style-type: none"> ■ You are not getting better ■ Other 	<ul style="list-style-type: none"> ■ CONTACT YOUR DOCTOR FOR AN URGENT APPOINTMENT
DANGER SIGNS	ACTION
<ul style="list-style-type: none"> ■ Very short of breath at rest ■ Chest pain ■ High fever ■ A feeling of agitation, fear, drowsiness or confusion ■ Other 	<p>DIAL 911</p> <ul style="list-style-type: none"> ■ For an ambulance or go to the nearest emergency department

MEDICATION OPTIONS FOR WORSENING SYMPTOMS

RELIEVER

Take extra _____ inhaler/nebulizer as needed up to _____

ANTIBIOTIC

Take _____ mg. (_____ tablets) _____ times a day for _____ days

PREDNISONE

Take Prednisone _____ mg (_____ tablets) daily for _____ days

Then Prednisone _____ mg (_____ tablets) daily for _____ days

CONTACT your doctor if you are not getting better

My FEV₁ was _____ on _____ (date)

My PaO₂ was _____ on _____ (date)

Reprinted with permission: Watson, P. B., Town, G. I., Holbrook, N., Dwan, C., Toop, L. J., & Drennan, C. J. (1997). Evaluation of a self-management plan for chronic obstructive pulmonary disease. *European Respiratory Journal*, 10(6), 1267-1271. Copyright © European Respiratory Society Journals Ltd.

Appendix O: Selection Criteria for Referral to a Pulmonary Rehabilitation Program

CRITERIA	INFORMATION
Severity of Disease	<ul style="list-style-type: none"> ■ Regardless of severity, individuals may benefit from an exercise program when clinically stable or recovery post-exacerbation ■ Pre-operative lung resection, lung volume reduction surgery or lung transplantation
Disease Effect on Quality of Life	<ul style="list-style-type: none"> ■ Increased level of dyspnea ■ Physical de-conditioning and decreased ability to perform activities of daily living ■ Social isolation ■ Increased dependence on formal and informal caregivers ■ Increased level of anxiety when performing daily activities
Co-morbid Conditions	<ul style="list-style-type: none"> ■ Active or associated co-morbid conditions should be stable prior to commencing program ■ Early intervention in treating malnutrition is crucial
Use of Medical Resources	<ul style="list-style-type: none"> ■ Frequent hospitalization, emergency room visits
Smoking History	<ul style="list-style-type: none"> ■ Policies vary from program to program; some programs will only accept non-smokers while other programs offer smoking cessation programs prior to entry to Pulmonary Rehabilitation
Motivation	<ul style="list-style-type: none"> ■ Individual with COPD understands the benefit of Pulmonary Rehabilitation and is able to commit to lifestyle change ■ The individual is able to commit the time required for active program participation ■ Transportation requirements may need to be addressed prior to start date

RNAO Guideline Development Panel, 2005

Appendix P: Borg Scale

The Borg scale is a categorical scale consisting of numbers and a set of verbal qualifiers. It is used to measure exertional dyspnea during cardiopulmonary exercise testing and training and is also referred to as a Rating of Perceived Dyspnea (RPD) scale. Originally, the Borg scale was developed to measure exertion and for this use is referred to as the Rating of Perceived Exertion (RPE) scale. The original RPE scale ranges from 6 to 20. This version is still used, particularly for measuring exertion in cardiac patients, as ratings correlate well with heart rate. A 10-point ratio scale was subsequently developed and is the version most commonly used to quantify dyspnea (RPD) and exertion (RPE) in COPD.

Borg Scale

0	Nothing at all
0.5	Very, very slight (just noticeable)
1	Very slight
2	Slight
3	Moderate
4	Somewhat severe
5	Severe
6	
7	Very severe
8	
9	Very, very severe (almost maximal)
10	Maximal

How to use the Borg scale?

The Borg scale should be reproduced in a large and easy-to-read format and explained to the patient prior to the exercise test or training session. The explanation should be standardized. If the dyspnea scale is being used during a graded exercise test, the standardized explanation might read as follows:

“The purpose of this scale is to measure your shortness of breath during the exercise test. Ten corresponds to ‘maximal shortness of breath.’ It is important that you respond according to what you are feeling. At 1-minute intervals and at the end of the test, I will ask you to point to the number that best represents your shortness of breath.” (p. 351)

Reprinted with permission: B. C. Decker, Inc.

Bourbeau, J., Nault, D., & Borycki, E. (2002). *Comprehensive management of chronic obstructive pulmonary disease*. Hamilton, Ontario: B.C. Decker, Inc.

Appendix Q: Description of the Toolkit

Toolkit: Implementation Clinical Practice Guidelines

Best practice guidelines can only be successfully implemented if there are: adequate planning, resources, organizational and administrative support as well as appropriate facilitation. RNAO, through a panel of nurses, researchers and administrators has developed the *Toolkit: Implementation of Clinical Practice Guidelines* based on available evidence, theoretical perspectives and consensus. The *Toolkit* is recommended for guiding the implementation of any clinical practice guideline in a healthcare organization.

The *Toolkit* provides step-by-step directions to individuals and groups involved in planning, coordinating, and facilitating the guideline implementation. Specifically, the *Toolkit* addresses the following key steps in implementing a guideline:

1. Identifying a well-developed, evidence-based clinical practice guideline
2. Identification, assessment and engagement of stakeholders
3. Assessment of environmental readiness for guideline implementation
4. Identifying and planning evidence-based implementation strategies
5. Planning and implementing evaluation
6. Identifying and securing required resources for implementation

Implementing guidelines in practice that result in successful practice changes and positive clinical impact is a complex undertaking. The *Toolkit* is one key resource for managing this process.

The *Toolkit* is available through the Registered Nurses' Association of Ontario. The document is available in a bound format for a nominal fee, and is also available free of charge from the RNAO website. For more information, an order form or to download the *Toolkit*, please visit the RNAO website at www.rnao.org/bestpractices.



Best Practice Guideline

NURSING CARE OF DYSPNEA: THE 6TH VITAL SIGN IN INDIVIDUALS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD) *Guideline supplement*

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Supplement Integration

Similar to the original guideline publication, this document needs to be reviewed and applied, based on the specific needs of the organization or practice setting/environment, as well as the needs and wishes of the client. This supplement should be used in conjunction with the guideline as a tool to assist in decision making for individualized client care, as well as ensuring that appropriate structures and supports are in place.

Background

Since the original publication of this guideline, current epidemiological data indicates that COPD is an increasing health issue worldwide (Canadian Lung Association (CLA), 2009; Petty, 2005). By 2020, The Canadian Lung Association (2008) reports that COPD is expected to be the third leading cause of death worldwide. There appears to be a continuous rise in the incidence and morbidity of COPD in women between the ages of 55 and 74 (CLA, 2008; Lacasse, Brooks & Goldstein, 1999; Li, 2004). At present, nationally, COPD affects 3.9 per cent of men and 4.8 per cent of women (CLA, 2009). The Canadian Lung Association (2008) suggests that COPD affects an estimated 1.5 million Canadians. They further suggest that 1.6 million Canadians 40 years or older may currently have

undiagnosed COPD; thus, in excess of three million Canadians may be living with COPD.

Revision Process

The Registered Nurses' Association of Ontario (RNAO) has made a commitment to ensure that this practice guideline is based on the best available evidence. In order to meet this commitment, a monitoring and revision process has been established for each guideline every three years.

A panel of nurses was assembled for this review, comprised of members from the original development panel as well as other recommended individuals with particular expertise in this practice area. A structured evidence review based on the scope of the original guideline and supported by three clinical questions was conducted to capture the relevant literature and guidelines published since



the original publication. The following research questions were established to guide the literature review:

1. In clients with chronic obstructive pulmonary disease (COPD), what are the effective methods of respiratory assessment in order to identify stable and unstable dyspnea and acute respiratory failure?
2. In clients with COPD, what are the most effective interventions that will help decrease episodes of all levels of dyspnea including acute episodes of respiratory distress?
3. In clients with COPD, what are the educational strategies that will help increase client's knowledge of preventative care in dyspnea and facilitate effective self care behaviour?

Initial findings regarding the impact of the current evidence, based on the original recommendations, were summarized and circulated to the review panel. The revision panel members were given a mandate to review the original guideline in light of the new evidence, specifically to ensure the validity, appropriateness and safety of the guideline recommendation as published in 2005.

Literature Review

One individual searched an established list of websites for guidelines and other relevant content. This list was compiled based on existing knowledge of evidence-based practice websites and recommendations from the literature.

Members of the panel critically appraised ten international guidelines, published since 2004, using the "Appraisal of Guidelines for Research and Evaluation" instrument (The AGREE Col-

laboration, 2001). From this review, eight guidelines were identified to inform the review process:

- Institute for Clinical Systems Improvement. (2009). Diagnosis and management of chronic obstructive pulmonary disease. *Institute for Clinical Systems Improvement*, Ed.7, pg 1-51.
- Management of COPD Working Group. (2007). VA/DoD clinical practice guideline for the management of outpatient chronic obstructive pulmonary disease. Washington (DC): *Department of Veteran Affairs, Department of Defense*, 2, 1-138.
- McKenzie, D. K., Frith, P. A., Burdon, J. G. W. & Town, I. (2006). The COPD-X plan: *Australian and New Zealand guidelines for the management of chronic obstructive pulmonary disease*. Australian Lung Foundation, 1-66.
- O'Donnell, D. E., Aaron, S., Bourbeau, J., Hernandez, P., Marciniuk, D.D., Balter, M., et al. (2007). Canadian Thoracic Society recommendations for management of chronic obstructive pulmonary disease – 2007 update. *Canadian Respiratory Journal*, (Suppl B), 5B-32B.
- O'Donnell, D.E., Aaron, S., Bourbeau, J., Hernandez, A., Marciniuk, D.D., Balter, M. et al. (2008). Canadian Thoracic Society recommendations for management of chronic obstructive pulmonary disease-2008 update. *Canadian Respiratory Journal*, (Suppl A), 1A-8A.
- O'Driscoll, B.R., Howard, L.S., & Davison, A.G. (2008). Guideline for emergency oxygen use in adult patients. *Thorax*, 63(suppl VI), vi1-vi73.

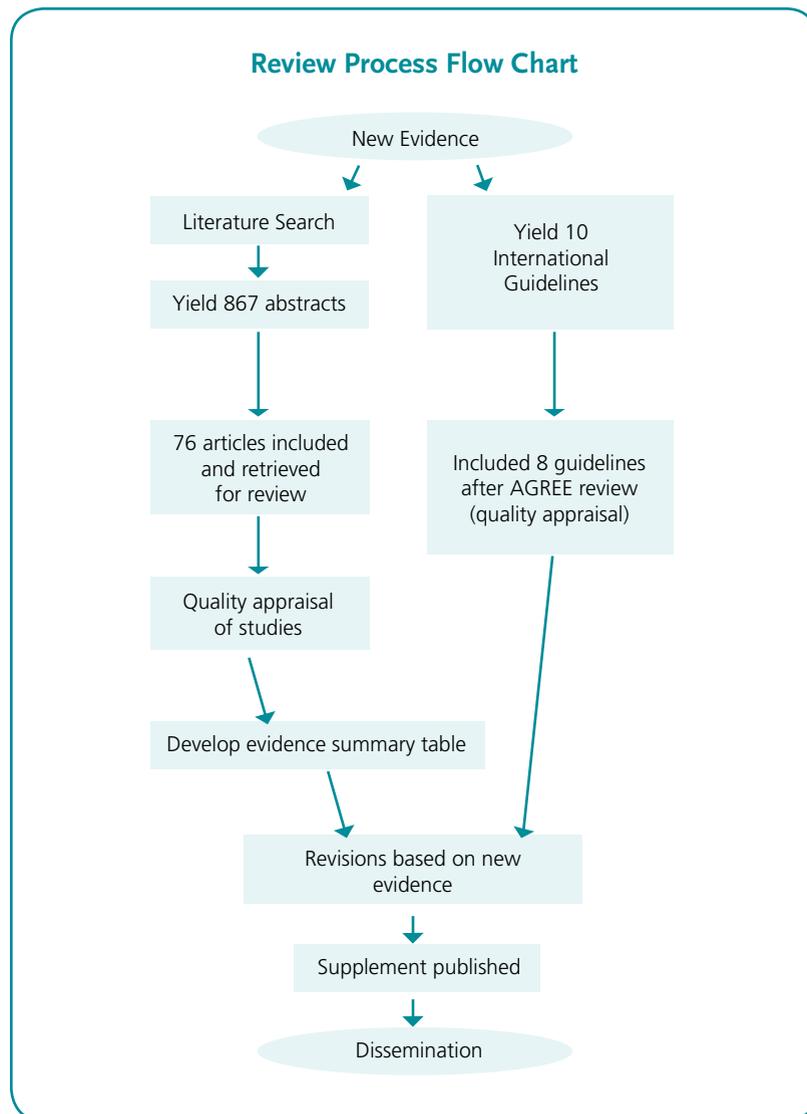
- Qaseem, A., Snow, V., Shekelle, P., Sherif, K., Wilt, T., Weinberger, S. et al. (2007). Diagnosis and management of stable chronic obstructive pulmonary disease: A clinical practice guideline from the American College of Physicians. *Annals of Internal Medicine*, 147, 633-638.

- Registered Nurses Association of Ontario (2007). *Integrating smoking cessation into daily nursing practice*. Toronto, Canada: Registered Nurses' Association of Ontario.

Concurrent with the review of existing guidelines, a search for recent literature relevant to the scope of the guideline was conducted with guidance from the Team Leader. The search of electronic databases, (Medline, CINAHL and EMBASE) was conducted by a health sciences librarian. A Research Assistant (Master's prepared nurse) completed the inclusion/exclusion review, quality appraisal and data extraction of the retrieved studies, and prepared a summary of literature findings. The comprehensive data tables and reference lists were provided to all panel members.

Review Findings

In September 2009, the panel was convened to achieve consensus on the need to revise the existing set of recommendations. A review of the most recent literature and relevant guidelines published since January 1, 2004 does not support dramatic changes to the recommendations, but rather suggest some refinements and stronger evidence for our approach. A summary of the review process is provided in the following flow chart:



Summary of Evidence

The following content reflects the changes made to the original publication (2005) based on the consensus of the review panel. The literature review does not support dramatic changes to the recommendations but rather suggests some refinements and stronger evidence for the approach.

Recommendation 3.0 has been modified to include additional bullet: **Combination Treatments (Level of Evidence = Ia)**.

A new Recommendation 6.0 has been added to expand on the need for nurses working with patients with advanced illness to ensure highest quality of life for person experiencing dyspnea at end-of-life. As a result of this new recommendation, the final point: End-of-life decision-making/advanced directives (Level of Evidence=IV) has been removed from Recommendation 5.0 and the Education, Organization and Policy and Program/Services recommendations numbering has changed to 7.0, 8.0 and 9.0 respectively.

Practice Recommendations

-  unchanged
-  changed
-  additional information
- NEW**  new recommendation

<p>Recommendation 1.0</p> <p>Nurses will acknowledge and accept the patients' self-report of dyspnea. (Level of Evidence = IV)</p>	
<p>Recommendation 1.1 of original guideline on page 22 has changed for the assessment of Present level of dyspnea to differentiate between patients who are able to self-report and patients unable to self-report and the type of measurement scale to be used. An additional assessment parameter, swallowing assessment, has been added. Note: changes are in bold font:</p> <p>All individuals identified as having dyspnea related to COPD will be assessed appropriately (See Figure 1 – COPD Decision Tree). Respiratory assessment should include:</p> <ul style="list-style-type: none"> ■ Level of dyspnea <ul style="list-style-type: none"> • Present level of dyspnea (for patients who are able to self-report) Present dyspnea should be measured using a quantitative scale such as a visual analogue (Appendix C) or numeric rating scale (Appendix D) • Present level of dyspnea (for patients who are unable to self-report) Present level of dyspnea should be measured using a quantitative scale such as the Respiratory Distress Observation Scale (RDOS), (Campbell, 2008), see Appendix Ea. ■ Usual level of dyspnea <ul style="list-style-type: none"> • Usual dyspnea should be measured using a quantitative scale such as the Medical Research Council (MRC) Dyspnea scale (Appendix E) ■ Vital signs ■ Pulse oximetry ■ Chest auscultation ■ Chest wall movement and shape/abnormalities ■ Presence of peripheral edema ■ Accessory muscle use ■ Presence of cough and/or sputum ■ Ability to complete a full sentence ■ Level of consciousness ■ Watch for swallowing difficulties <p style="text-align: right;">(Level of Evidence=IV)</p>	
<p><i>The discussion of evidence for this recommendation found on page 22 of the original guideline has been revised to reflect additional literature support and a new revised paragraph on dyspnea as a subjective symptom as follows:</i></p> <p>Discussion of Evidence</p> <p>On page 22, first paragraph: Patient's descriptors of breathlessness vary depending of the intensity of their dyspnea experience (von Leupoldt et al., 2007). Often the presenting symptom of acute dyspnea is anxiety (von Leupoldt & Dahme, 2007). Nurses may focus on anxiety to the exclusion of dyspnea (Bailey, Collella, & Mossey, 2004). Nurses need to recognize anxiety as an important and potentially measurable sign of invisible dyspnea for patients with acute respiratory distress (Bailey, 2004).</p>	

Although **dyspnea is a subjective experience**, it is characterized by observable behaviours (Campbell, 2008). An inability of the patient to self-report may result in a failure by nurses to identify and appropriately treat this distressing symptom (Campbell, 2009). Campbell (2008a) suggests that stimulation of the “autonomic neurological system produces observational and measurable behaviours” (p. 54). These involuntary responses are elicited sequentially and include: increased heart rate, tachypnea, restlessness, and use of accessory muscles, end expiratory grunting, involuntary nasal flaring and fearful facial expression (Campbell, 2007). The Respiratory Distress Observation Scale (RDOS) is a reliable and valid instrument available to assist nurses in the assessment of dyspnea in patients who are unable to self-report (Campbell, 2008b).

*The discussion of evidence for this recommendation found on **page 23** of the original guideline has been revised to reflect additional literature support and a new final paragraph on the prevalence of GERD in patients with advanced COPD as follows:*

An increased incidence of gastroesophageal reflux (GERD) has been identified in individuals with a diagnosis of COPD (Rodrigues, Ruigmez, Martin-Merino, Johnson & Wallander, 2008). Individuals with advanced COPD have an increased prevalence of asymptomatic GERD (Casanova et al., 2004; Kempainen et al., 2007). Researchers also suggest that the presence of GERD symptoms is associated with increased acute exacerbations (AECOPD) (Gross, Atwood, Ross, Olsewski, & Eichorn, 2009; Rascon-Agular et al., 2006). Impaired co-ordination between the respiratory cycle and swallowing function has been observed by a number of researchers in individuals with moderate to severe COPD (Good-Fratturelli, Curlee & Holle, 2000; Kobayashi, Kubo & Yanai, 2007; Mokhlesi, Logemann, Rademaker, Stangl & Corbridge, 2002). The normal deglutition pattern of exhale-swallow-exhale is often altered in individuals with COPD who frequently inhale rather than exhale following the swallow. This dysfunction may place individuals at increased risk for aspiration as the negative pressure generated by inspiration may pull food or liquid toward the lungs.

Recommendation 1.1, Figure 1: COPD Decision Tree found on page 24 of the original guideline: **Methylxanthines has been removed from pharmacological agents list in the Nursing Intervention Box under the section for Unstable/Acute as follows:**

Figure 1 COPD Decision Tree, under Unstable/Acute section:

NURSING INTERVENTIONS

- Ongoing monitoring of vital signs, pulse oximetry, level of consciousness and respiratory parameters
- **Administration of the following pharmacological agents as prescribed:**
 - Bronchodilators
 - Beta 2 Agonists
 - Anticholinergics
- Corticosteroids
- Antibiotics
- Oxygen
- Opioids (Palliative)
- Preparation for non-Invasive/Invasive Mechanical Ventilation for severe acute exacerbations

Additional Literature Supports

Management of COPD Working Group (2007)

O'Driscoll et al. (2008)

<p>Recommendation 1.2 Nurses will be able to identify stable and unstable dyspnea, and acute respiratory failure. (Refer to Table 1 for descriptors of disease severity as related to progressive clinical symptoms.) (Level of Evidence=IV)</p>	
<p>Additional Literature Support Institute for Clinical Systems Improvement (2009) McKenzie et al. (2006) Qaseem et al. (2007)</p>	
<p>Recommendation 1.3 Every adult with dyspnea who has a history of smoking and is over the age of 40 should be screened to identify those most likely to be affected by COPD. As part of the basic dyspnea assessment, nurses should ask every patient: <ul style="list-style-type: none"> ■ Do you have progressive activity related shortness of breath? ■ Do you have a persistent cough and sputum production? ■ Do you experience frequent respiratory tract infections? (Level of Evidence=IV)</p>	
<p>Recommendation 1.4 For patients who have a history of smoking and are over the age of 40, nurses should advocate for spirometric testing to establish early diagnosis in at risk individuals. (Level of Evidence=IV)</p>	
<p>Recommendation 2.0 Nurses will be able to implement appropriate nursing interventions for all levels of dyspnea including acute episodes of respiratory distress: <ul style="list-style-type: none"> ■ Acknowledgment and acceptance of patients' self-report of present level of dyspnea ■ Medications ■ Controlled oxygen therapy ■ Secretion clearance strategies (Appendix H) ■ Non-invasive or invasive ventilation modalities ■ Energy conserving strategies (Appendix I) ■ Relaxation techniques (Appendix J) ■ Nutritional strategies ■ Breathing retraining strategies (Appendix J) (Level of Evidence=IV)</p>	
<p><i>The discussion of evidence for this recommendation found on page 28 of the original guideline has been revised to reflect additional literature support. Refer to Recommendation 1.1 Discussion of Evidence, new paragraphs on patient descriptors of breathlessness and dyspnea as a subjective experience. These new paragraphs added in 1.1 also apply to 2.0 discussion of evidence under: Acknowledgement and Acceptance of Patients' Self Report of Present Level of Dyspnea.</i></p>	

On **page 33** of the original guideline, Table 2 in the Symptoms and Potential Nutrition Solutions Chart, **utilizing holding chamber** is an added bullet point under Solutions for Oral thrush due to improper inhaled corticosteroid as follows:

Table 2 in the Symptoms and Potential Nutrition Solutions

Symptoms	Solutions
Oral thrush due to improper inhaled corticosteroid use	<ul style="list-style-type: none"> ■ Assess oral cavity ■ Promote good dental hygiene ■ Ensure appropriate medical follow up ■ Ensure adequate rinsing of mouth post inhaled corticosteroid ■ Consider liquid nutritional supplementation if individual is unable to eat ■ Utilize holding chamber

Additional Literature Supports
 Garcia, Rocha, Pinto, Lopes, & Barbara (2008)
 Hill et al. (2006)
 Nield, Soo Hoo, Roper, & Santiago (2007)
 O'Driscoll et al. (2008)

+

Recommendation 2.1

Nurses must remain with patients during episodes of acute respiratory distress.
 (Level of Evidence=IV)

✓

Recommendation 2.2

Smoking cessation strategies should be instituted for patients who smoke:

- Refer to RNAO (2007) guideline, Integrating Smoking Cessation into Daily Nursing Practice
- Use of nicotine replacement and other smoking cessation modalities during hospitalization for acute exacerbation.

(Level of Evidence=IV)

✓

Additional Literature Supports
 Garcia et al. (2008)
 Hill et al. (2006)
 Holland, Hill, Nehez, & Ntoumenopoulos (2004)
 Institute for Clinical Systems Improvement (2009)
 McKenzie et al. (2006)
 Mota et al. (2007)
 O'Donnell et al. (2007)
 Putt, Watson, Seale, & Paratz (2008)
 Wilson, Fitzsimons, Bradbury, & Elborn (2008)

+

Recommendation 3.0

Nurses should provide appropriate administration of the following pharmacological agents as prescribed:

- (See Appendix L – COPD Medications)
- Bronchodilators (Level of Evidence = Ib)
 - Beta 2 Agonists
 - Anticholinergics
 - Methylxanthines
- Oxygen (Level of Evidence = Ib)
- Corticosteroids (Level of Evidence = Ib)
- **Combination Treatments (Level of Evidence = Ia)**
- Antibiotics (Level of Evidence = Ia)
- Psychotropics (Level of Evidence = IV)
- Opioids (Level of Evidence = IV)



The discussion of evidence for this recommendation found on pages 36 and 37 of the original guideline has been revised to reflect additional literature support and an additional paragraph under Corticosteroids which addresses Inhaled/IV corticosteroids. A new section on Combination Treatments has been added to the discussion of evidence:



Discussion of Evidence

Inhaled/IV Corticosteroids

Corticosteroids are available in inhaled, oral and parenteral forms. The role of inhaled corticosteroids (ICS) in COPD is controversial (O'Donnell et al., 2008) as they do not have consistent effects on airway inflammation, pulmonary function, symptoms, frequency or severity of exacerbation. ICS alone is generally inferior to an ICS and LABA combination.

Combination Treatments

Two combination inhaled corticosteroids (ICS) and long acting bronchodilators (LABA) products are currently available: fluticasone propionate plus salmeterol, and budesonide plus formoterol fumarate dihydrate. Combination treatment allows for a simplified regime. For patients with moderate to severe COPD with persistent symptoms and a history of exacerbations (one or more per year, on average for two years), a combination of tiotropium plus a LABA and ICS therapy product is recommended to improve bronchodilation and lung deflation, to reduce the frequency and severity of exacerbations and to improve health status (O'Donnell et al., 2008).

Additional Literature Supports
 Institute for Clinical Systems Improvement (2009)
 McKenzie et al. (2006)
Bronchodilators:
 Adams, Anzueto, Briggs, Menjoge, & Kesten (2006)
 Akamatsu et al. (2007)
 Ambrosino et al. (2008)
 Baumgartner et al. (2007)
 Cote, Pearle, Sharafkhaneh, & Spangenthal (2009)
 Kawayama et al. (2008)
 O' Donnell et al. (2004)
 Shioya et al. (2008)
 Stockley, Chopra, & Rice (2006)
 Zhou et al. (2006)



<p>Combination treatments Aaron et al. (2007) Calverley et al. (2007) Kardos, Wencker, Glaab, and Vogelmeier (2007)</p> <p>Steroids: Leigh, Pizzichini, Morris, Maltais, Hargreave, & Pizzichini (2006) Sposato, Mariotta, Palmiero, Ricci, Gencarelli, & Franco (2007)</p> <p>Antibiotics: File et al. (2001) Starakis, Gogos, & Bassaris (2004) Swanson, Lainez-Ventosilla, De Salvo, Dunne, & Amsden (2005) Xu et al. (2006)</p>	
<p>Recommendation 3.1 Nurses will assess patients' inhaler device technique to ensure accurate use. Nurses will coach patients with sub-optimal technique in proper inhaler/device technique (Appendix M – Device Technique). (Level of Evidence=Ia)</p>	✓
<p>Recommendation 3.2 Nurses will be able to discuss the main categories of medications with their patients including:</p> <ul style="list-style-type: none"> ■ Trade and generic names ■ Indications ■ Doses ■ Side effects ■ Mode of administration ■ Pharmacokinetics ■ Nursing considerations <p>(See Appendix L – COPD Medications) (Level of Evidence=IV)</p>	✓
<p>Recommendation 3.3 Annual influenza vaccination should be recommended for individuals who do not have a contraindication. (Level of Evidence=IV)</p>	✓
<p>Additional Literature Supports Management of COPD Working Group (2007) Wongsurakiat et al. (2004)</p>	+
<p>Recommendation 3.4 COPD patients should receive a pneumococcal vaccine at least once in their lives (high risk patients every 5 to 10 years). (Level of Evidence=IV)</p>	✓
<p>Recommendation 4.0 Nurses will assess for hypoxemia/hypoxia and administer appropriate oxygen therapy for individuals for all levels of dyspnea. (Level of Evidence=IV)</p>	✓
<p>Additional Literature Supports O'Driscoll et al. (2008)</p>	+

<p>Recommendation 5.0 Nurses should support disease self-management strategies including:</p> <ul style="list-style-type: none"> ■ Action plan development (Level of Evidence = Ib) <ul style="list-style-type: none"> • Awareness of baseline symptoms and activity level • Recognition of factors that worsen symptoms • Early symptom recognition of acute exacerbation/infection 	
<p><i>Recommendation 5.0 of the original guideline on page 42 has last bullet point: End-of-life decision making/advanced directives (Level of Evidence = IV) removed.</i></p> <p>Additional Literature Supports Wong et al. (2005)</p>	+
<p>Recommendation 5.1 Nurses should promote exercise training.</p> <p style="text-align: right;">(Level of Evidence=IV)</p>	✓
<p>Recommendation 5.2 Nurses should promote pulmonary rehabilitation.</p> <p style="text-align: right;">(Level of Evidence=IV)</p>	✓
<p>Additional Literature Supports Boxall, Barclay, Sayers, & Caplan (2005) Donesky-Cueco, Janson, Neuhaus, Neilands, & Carrieri-Kohlman (2007) Guell et al. (2008) Maltais et al. (2008) McKenzie et al. (2006) Romagnoli et al. (2006) Wong et al. (2005)</p>	+
<p>Recommendation 6.0 Nurses working with patients with advanced illness causing dyspnea and their families will have the appropriate knowledge and skills to:</p> <ul style="list-style-type: none"> ■ encourage and promote ongoing dialogue regarding patient values, desired outcomes and treatment options, ■ ameliorate dyspnea and other distressing physical, emotional, social and spiritual symptoms using appropriate integrative and pharmacological approaches, ■ work collaboratively with an inter-professional team to ensure the highest quality of life possible for the person experiencing dyspnea at the end-of-life. <p style="text-align: right;">(Level of Evidence=IV)</p>	NEW
<p><i>The new recommendation and discussion of evidence follows after Key Points box on page 46 of the original guideline to reflect additional literature support with the addition of the paragraph below:</i></p> <p>Discussion of Evidence To date, there has been little research examining end-of-life care in patients with advanced COPD (Goodridge et al., 2008, 2009). Nevertheless, improving the quality of end-of-life care in individuals living with COPD is a high priority (Goodridge et al., 2008, 2009; Rocker et al., 2007). Patients with advanced COPD have special palliative care needs as their final years are characterized by progressive functional decline, poor quality of life, increasing dependency on informal caregivers and on the health care system as a result of incapacitating</p>	NEW

breathlessness (Rocker et al., 2007). Attention to the management of dyspnea, anxiety and treatment decision-making are priority concerns when providing end-of-life care to patients with COPD (Goodridge et al.; Spence, 2009).

While any person with a serious illness may experience diminished decision-making capacity and incur the risk of receiving health care inconsistent with their preferences, older adults are particularly vulnerable to receiving unwelcome and inappropriate curative care (Somogyi-Zalud, Zhong, Hamel, and Lynn, 2002; Winzelberg, Hanson, and Tulsy, 2005). When it eventually becomes clear that dying is inevitable, rapidly hastening cognitive impairment and severe disability make it impossible to ascertain with any accuracy the wishes and preferences older dying persons may have about their treatment (Dunstan, 1996). Up to 75% of hospitalized patients lack decision-making capacity when urgent choices about initiating, maintaining or discontinuing life-sustaining therapies should be made (Bedell and Delbanco, 1984; Dunstan, 1996; Reilly, Wagner, and Magnussen, 1994).

In spite of dyspnea being often poorly controlled and incapacitating in advanced stage COPD (Gore, Brophy, and Greenstone, 2000), access to supportive services such as palliative care services in hospital or at home is much more limited for these individuals than for persons with cancer (Currow, Agar, Sanderson and Abernethy, 2008; Goodridge, et al., 2008). Because many persons with advanced COPD have developed trusting relationships with nurses in community and hospital settings, it is important for these nurses to develop skill and knowledge in the provision of palliative care. Nurses should ensure that end-of-life care planning (which may include the completion of advance directives) occurs in a culturally safe manner for all patients with serious illness. End-of-life care planning should include dialogue about surrogate decision-makers, resuscitation, emergency treatment (including intubation) and ongoing mechanical ventilation, and be initiated as early as possible in the course of the illness before the end-of-life. Advance Care Planning (ACP) is the process by which a person considers options about future health care decisions and identifies what his or her wishes are (Canadian Hospice and Palliative Care Association and Bruyere Continuing Care [CHPCA], 2009). End-of-life care planning may be initiated at diagnosis, if appropriate to the patient's circumstances. Additional triggers for end-of-life care planning include situations where: there is serious impairment of functional status; the patient is asking questions salient to the end-of-life; or when the provider would not be surprised if the patient died in the next 12 months (Goodridge, Marciniuk, Brooks, van Dam, Hutchinson, and Bailey, et al., 2009; Rocker et al., 2007), see **Appendix P-a**.

There is some evidence supporting the use of opioids for the treatment of dyspnea with individuals in the end stages of COPD (Currow, Plummer, Frith, and Abernethy, 2007; Jennings, Davies, Higgins, Gibbs, and Broadley, 2002; Rocker et al., 2007). Rocker et al. (2009) stress the usefulness of very small doses of opioids (start low, go slow), when conventional treatments have been optimized. Patients with advanced COPD and their health care providers, however, have yet to benefit from the breadth of rigorous research studies that have been conducted among their cancer counterparts (Rocker et al., 2009). Although its use is associated with some side effects, a number of randomized trials and a meta-analysis suggest that oral opioids reduced the sensation of dyspnea. The efficacy of nebulized opioids has not been demonstrated for management of dyspnea. Oral and parenteral routes continue to be recommended as a route of administration (Foral, Malesker, Huerta, and Hilleman, 2004).

Additional Literature Supports:
Lanken et al. (2008)



<p>EDUCATION RECOMMENDATION: Changes to 7.0 in numbering starting on page 46 of the original guideline with addition of NEW Practice Recommendation 6.0.</p>	
<p>Recommendation 7.0 Nurses working with individuals with dyspnea related to COPD will have the appropriate knowledge and skills to:</p> <ul style="list-style-type: none"> ■ Recognize the importance of individual’s self report of dyspnea ■ Provide COPD patient education including: <ul style="list-style-type: none"> • Smoking cessation strategies • Pulmonary rehabilitation/exercise training • Secretion clearance strategies • Breathing retraining strategies • Energy conserving strategies • Relaxation techniques • Nutritional strategies • Role/rationale for oxygen therapy • Role/rationale for medications • Inhaler device techniques • Disease self-management and action plans • End-of-life issues ■ Conduct appropriate referrals to physician and community resources <p style="text-align: right;">(Level of Evidence=IV)</p>	
<p>Additional Literature Supports Institute for Clinical Systems Improvement (2009) McKenzie et al. (2006)</p>	
<p>ORGANIZATION RECOMMENDATIONS: Changes to 8.0 in numbering starting on page 47 to 49 of the original guideline with addition of NEW Practice Recommendation 6.0.</p>	
<p>Recommendation 8.0 Organizations must institutionalize dyspnea as the 6th vital sign.</p> <p style="text-align: right;">(Level of Evidence=IV)</p>	
<p>Recommendation 8.1 Organizations need to have in place COPD Educators to teach both nurses and patients.</p> <p style="text-align: right;">(Level of Evidence=IV)</p>	
<p>Recommendation 8.2 Organizations need to ensure that a critical mass of health professionals are educated and supported to implement the COPD BPG in order to ensure sustainability.</p> <p style="text-align: right;">(Level of Evidence=IV)</p>	
<p>Recommendation 8.3 Organizations will ensure sufficient nursing staff to provide essential care, safety and support for individuals with all levels of dyspnea.</p> <p style="text-align: right;">(Level of Evidence=IV)</p>	

<p>Recommendation 8.4</p> <p>Organizations should have available sample medication delivery devices, spacer devices, sample templates of action plans, visual analogue scales, numeric rating scales, MRC scales and patient education materials.</p> <p>(Level of Evidence=IV)</p>	
<p>Recommendation 8.5</p> <p>Organizations need to have in place best practice guideline specific strategies to facilitate implementation.</p> <p>Organizations may wish to develop a plan for implementation that includes:</p> <ul style="list-style-type: none"> ■ A process for the assessment of the patient population (e.g., numbers, clinical diagnostic practices, co-morbidities, average length of stay) of individuals usually cared for in their institution that are living with dyspnea related to COPD. ■ A process for the assessment of documentation practices related to the monitoring of dyspnea (usual and present dyspnea and dyspnea related therapies (e.g., SPO₂). ■ A process for the evaluation of the changes in the patient population and documentation strategies pre- and post-implementation. ■ A process for the assessment of policies supporting the care of individuals living with dyspnea related to COPD. <p>(Level of Evidence=IV)</p>	
<p>Recommendation 8.6</p> <p>Organizations need to develop specific pre-implementation and outcome markers to monitor the impact of the implementation of this BPG on the care of individuals with dyspnea related to COPD. Organizations may wish to evaluate:</p> <ul style="list-style-type: none"> ■ Nursing knowledge base pre- and post-implementation. ■ Length of time between acute exacerbations of COPD (AECOPD) for specific individuals (perhaps globally represented by the number of acute care admissions and/or use of acute care resources over time pre- and post-implementation). ■ Development of documentation strategies to monitor and enhance care of individuals living with dyspnea related to COPD (integration of usual and present dyspnea on vital sign records within the institution). ■ Development of policies institutionalizing an education program for nurses caring for individuals living with dyspnea related to COPD. <p>(Level of Evidence=IV)</p>	

<p>Recommendation 8.7</p> <p>Nursing best practice guidelines can be successfully implemented only where there are adequate planning, resources, organizational and administrative support. Organizations may wish to develop a plan for implementation that includes:</p> <ul style="list-style-type: none"> ■ An assessment of organizational readiness and barriers to education. ■ Involvement of all members (whether in a direct or indirect supportive function) who will contribute to the implementation process. ■ Dedication of a qualified individual to provide the support needed for the education and implementation process. ■ Ongoing opportunities for discussion and education to reinforce the importance of best practices. ■ Opportunities for reflection on personal and organizational experience in implementing guidelines. <p>In this regard, RNAO (through a panel of nurses, researchers and administrators) has developed the Toolkit: Implementation of Clinical Practice Guidelines, based on available evidence, theoretical perspectives and consensus. The RNAO strongly recommends the use of this Toolkit for guiding the implementation of the best practice guideline on Nursing Care of Dyspnea: The 6th Vital Sign in Individuals with Chronic Obstructive Pulmonary Disease (COPD.)</p> <p style="text-align: right;">(Level of Evidence=IV)</p>	✓
<p>PROGRAM/SERVICES RECOMMENDATIONS: <i>Changes to 9.0 in numbering starting on page 49 to 50 of the original guideline with addition of NEW Practice Recommendation 6.0.</i></p>	
<p>Recommendation 9.0</p> <p>Pulmonary rehabilitation programs must be available for individuals with COPD to enhance quality of life and reduce healthcare costs.</p> <p style="text-align: right;">(Level of Evidence=Ia)</p>	✓
<p>Recommendation 9.1</p> <p>Palliative care services must be available for individuals and their carers living with COPD.</p> <p style="text-align: right;">(Level of Evidence=III)</p>	✓
<p>Recommendation 9.2</p> <p>Nursing research related to interventions for individuals with COPD must be supported.</p> <p style="text-align: right;">(Level of Evidence=IV)</p>	✓
<p>Recommendation 9.3</p> <p>All Nursing programs should include dyspnea associated with COPD as one context for learning core curricula concepts.</p> <p style="text-align: right;">(Level of Evidence=IV)</p>	✓
<p>Recommendation 9.4</p> <p>Funding regulations for oxygen therapy must be revisited to include those individuals with severe dyspnea, reduced ventilatory capacity and reduced exercise tolerance who do not qualify under the current criteria.</p> <p style="text-align: right;">(Level of Evidence=IV)</p>	✓

The Review Panel has identified updates to some appendices. Appendix L: **COPD Medications** and Appendix M: **Device Technique** each have sections updated. **Two new Appendices** have been added to the original document as follows:

- **Appendix Ea: Respiratory Distress Observation Scale (RDOS),**
- **Appendix Pa: Consensus statements regarding process indicators of quality of end-of-life care.**

Appendix Ea: Respiratory Distress Observation Scale (RDOS): To follow in section after Appendix E on page 95 of the original guideline.

Variable	0 points	1 point	2 points	Total
Heart rate per minute (auscultated)	Baseline to +5	Baseline + 6 -10 beats	Baseline +> 10 beats	
Respiratory rate per minute (auscultated)	Baseline to +3 breaths	Baseline + 4-6 breaths	Baseline +>6 breaths	
Restlessness: nonpurposeful movements	None	Occasional Slight movements	Frequent movements	
Accessory muscle use: rise in clavicle during inspiration	None	Slight rise	Pronounced rise	
Grunting at end-expiration: guttural sound	None		Present	
Nasal flaring: involuntary movement of nares	None		Present	
Look of fear	None		The upper iris is visible, the teeth are visible, the teeth are not parted, there are lines in the forehead, the eyebrows are flat, the eyebrows are raised, there are no wrinkles in the nose	

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Reference: Campbell, M. L. (2008b). Psychometric testing of a respiratory distress observation scale. *Journal of Palliative Care Medicine*, 11(1), 48.

Appendix L: COPD Medications on pages 114-121 have been revised as follows:

Methylxanthine:

- Page 115 of original guideline under Methylxanthine: **Quibron-T® has been removed** and **24-Hour: theophyllin** has “e”, corrected spelling.

Inhaled/Oral Steroids:

- Page 116 of original guideline **Ciclesonide has been added** under Inhaled/Oral Steroids.

Combination Drugs:

- Page 117 of original guideline under **ipratropium bromide and salbutamol: Combivent MDI 20up ipratropium/120ug salbutamol removed** as no longer available.

Antibiotics:

- Page 118 of original guideline: **telithromycin (Ketek) has been removed from** Macrolides/Anti-infectives.

Fluoroquinolone/Antibacterial:

- New Section added to include **moxifloxacin (Avelox)**

Vaccination:

- Page 121 of original guideline: **osteltamivir (Tamiflu) has been removed from** Vaccination and placed in a new category called **Antivirals**.

Anti-Virals (New section):

- **Osteltamivir (Tamiflu) and Relenza added.**

Full chart with revised sections can be found at: <http://www.rnao.org/dyspnea>

Appendix L: Changes have been made to the medication chart found on page 114-121 of original guideline. The chart below is an Abbreviated COPD Medication Chart showing only the categories changed. **Note that the full (all sections) revised Appendix L Medication chart can be found at:** <http://www.rmao.org/dyspnea>

Medications	Actions	Side Effects	Pharmacokinetics	Nursing Considerations
Inhaled Steroids:				
<p>Ciclesonide</p> <p>*Not indicated for COPD at this time</p> <ul style="list-style-type: none"> • Alvesco® MDI 100ug, 200ug 	<ul style="list-style-type: none"> • Ciclesonide is a nonhalogenated, glucocorticoid prodrug that is hydrolyzed to the pharmacologically active metabolite des-ciclesonide following administration. • Des-ciclesonide has a high affinity for the glucocorticoid receptor and exhibits anti-inflammatory activity. 	<p>Same as other inhaled corticosteroids.</p>	<p>Ciclesonide is presented in HFA –134a propellant and ethanol as a solution aerosol.</p> <p>Absorption: > 50% (active metabolite)</p> <p>Distribution: protein binding ≥ 99%, lung deposition - 52%</p> <p>Metabolism: ciclesonide hydrolyzed to active metabolite, des-ciclesonide via esterases in lungs, further metabolism via hepatic CYP3A4 and 2D6</p> <p>Excretion: feces (78%)</p> <p>Half Life: 6 hours</p>	
Fluoroquinolone / Antibacterial:				
<p>moxifloxacin (Avelox)</p> <ul style="list-style-type: none"> • PO/IV 400 mg daily for 7-14 days 	<ul style="list-style-type: none"> • Bactericidal, interferes with DNA replication, repair, transcription and recombination in susceptible gram-negative and gram-positive bacteria, preventing cell reproduction and leading to cell death 	<ul style="list-style-type: none"> • nausea • headache • vomiting • diarrhea • tendon inflammation/rupture 	<p>Absorption: unknown</p> <p>Distribution: crosses placenta</p> <p>Metabolism: liver</p> <p>Excretion: feces, urine</p> <p>Half-Life: 12-13.5 hrs</p>	<p>Allergy to fluoroquinolones</p> <p>Hypokalemia</p> <p>Hepatic impairment</p> <p>Monitor for tendon inflammation/rupture</p>
Antiviral:				
<p>Zanamivir (Relenza)</p> <p>Oral Inhalation</p> <p>5mg/blister (4 blisters per Rotadisk), packaged with Diskhaler inhalation device</p> <p>2 inhalations (10mg) twice daily x 5 days.</p> <p>Begin within 2 days of signs or symptoms</p>	<ul style="list-style-type: none"> • Selectively inhibits influenza virus neuraminidase: by blocking the action of this enzyme, there is decreased viral release from infected cells, increased formation of viral aggregates, and decreased spread of virus 	<ul style="list-style-type: none"> • headache • nausea • diarrhea • bronchospasm-use cautiously with patients with asthma or COPD-Fast acting bronchodilator should be on hand 	<p>Absorption: inhalation</p> <p>Distribution: unknown</p> <p>Metabolism: liver</p> <p>Excretion: feces and urine</p> <p>Half-Life: 2.5-5 hrs</p>	<p>Allergy to any components of the drug.</p> <p>COPD</p> <p>Asthma</p>
<p>oseltamivir (Tamiflu)</p> <ul style="list-style-type: none"> • PO 75 mg x 5 days begin treatment within 2 days of onset of symptoms 	<ul style="list-style-type: none"> • Inhibits influenza virus neuraminidase with possible alteration of virus particle aggregation and release 	<ul style="list-style-type: none"> • headache • fatigue • nausea • vomiting • diarrhea • cough • abdominal pain 	<p>Absorption: rapidly absorbed</p> <p>Distribution: protein binding is low</p> <p>Metabolism: converted to oseltamivir carboxylate</p> <p>Excretion: eliminated by conversion</p> <p>Half-Life: 1-3 hours</p>	

Appendix M: Device Technique

Revised sections:

On page 122:

Section: Medications: Inhalation Devices, **Spiriva® has been removed** in the second bullet for Dry Powder Inhalers:

Medications come in many forms. However most often they are taken by the inhaled route:

- Metered Dose Inhaler (puffer)
- Dry Powder Inhalers (Turbuhaler®, Diskus®, Diskhaler®, HandiHaler®)
- Nebulizer

Section A: Metered Dose Inhalers (MDI) additional information on Advair dose counters has been added as a last sentence of the paragraph (in **bold**):

Metered dose inhalers (MDI), or puffers, deliver a precise dose of medication to the airways when used appropriately. It is very important to have a good technique. A holding chamber or spacer is recommended for use with a MDI, particularly for those not able to use a puffer accurately. To determine whether the puffer is empty: (1) calculate the number of doses used, or (2) invert or shake it close to the ear several times and listen/feel for movement of liquid. One advantage of using the MDI is that it is quite portable. A number of different metered dose inhalers are available. Different pharmaceutical companies manufacture similar medications that are in different inhalers. **Advair has dose numbers on both MDI and Diskus.**

Section B: Dry Powder Inhalers (DPIs) on page 125, Key Point box for dry powder inhalers the last bullet (in **bold**) has been revised:

Key Point

General points of dry powder inhalers include:

- A quick forceful breath in is required to deliver the medications to the lungs, versus a slow breath for MDIs.
- **All DPIs contain a lactose carrier or filler.**

In Section B, under **Proper Use of a Turbuhaler®** on page 125 **points 2, 3 and 6 have been changed** for clarity as follows:

1. Unscrew the cover and remove it.
2. **Holding the device upright, turn the coloured wheel one way (right) & back (left) the other way until it clicks. The inhaler is now ready to use. Once you have done this, do not shake or turn the Turbuhaler® sideways or upside down as the medication will be lost.**
3. **Breathe out, away from the Turbuhaler® mouthpiece.**
4. Place the mouthpiece between your lips & tilt your head back slightly.
5. Breathe in deeply and forcefully.
6. **Remove the Turbuhaler® from your mouth while holding your breath. Continue holding your breath for about 10 seconds.**
7. If a second dose is prescribed, repeat the steps.

On page 127:

Appendix M, **Spiriva® has been removed in header: Proper Use of HandiHaler®** and for clarity points 1, 2, 3, 4, (in **bold**) have been revised:

1. **Press the green piercing button completely in and let go to release the dust cap.**
2. **Lift open the dust cap and mouthpiece.**
3. **Right before use, remove only one SPIRIVA® capsule from the blister.**
4. **Place the capsule in the centre chamber. It does not matter which end of the capsule is placed in the chamber.**
5. Close the mouthpiece firmly until you hear a click, leaving the dust cap open.
6. Hold the HandiHaler® device with the mouthpiece upwards and press the piercing button completely in once, and release. This makes holes in the capsule and allows the medication to be released when breathing in.
7. Breathe out completely. Do not breathe into the mouthpiece at any time.

8. Raise the HandiHaler® device to your mouth and close your lips tightly around the mouthpiece. Keep your head in an upright position and breathe in slowly and deeply but at a rate sufficient to hear the capsule vibrate. Breathe in until your lungs are full; then hold your breath as long as is comfortable and at the same time take the HandiHaler® device out of your mouth. Resume normal breathing. To ensure you get the full dose of Spiriva®, you must repeat steps 5 and 6 once again.
9. After you have finished taking your daily dose of Spiriva®, open the mouthpiece again. Tip out the used capsule and dispose.
10. Close the mouthpiece and dust cap for storage of your HandiHaler® device.

Appendix Pa: Consensus statements regarding process indicators of quality of end-of-life care.

To follow in section after Appendix P on page 135 of the original guideline.

Reprinted with permission: Pulsus Group Inc., Canadian Respiratory Journal 2009 16(5); e52.

Reference: Goodridge et al.(2008). End-of-life care for persons with advanced chronic obstructive pulmonary disease:

Report of a national interdisciplinary consensus meeting. *Canadian Respiratory Journal*, 16(5), e51-e53.

1. Initiating the dialogue and end-of-life care planning

- Clinicians should ensure that end-of-life care planning (which may include the completion of advanced directives) occurs in a culturally safe manner for all patients with serious illness. End-of-life care planning should include dialogue about surrogate decision-makers, resuscitation, emergency treatment (including intubation) and ongoing mechanical ventilation, and be initiated as early as possible in the course of the illness before the end-of-life (American College of Physicians)
- End-of-life care planning may be initiated at diagnosis, if appropriate, to the patient's circumstances. Additional triggers for end-of-life care planning include situations in which there is serious impairment of functional status, the patient is asking questions salient to the end-of-life or when the provider would not be surprised if the patient died in the following 12 months
- The topic of end-of-life care planning should be first introduced by the health care provider most trusted by the patient, although physician involvement in the decision-making process is crucial. Families and significant others play a pivotal role in planning for the end-of-life of people with advanced COPD. The involvement of and ongoing dialogue with family members and significant others in end-of-life care planning needs to be strongly encouraged by providers

2. Anticipating the need for end-of-life care

- While accurate prediction of the trajectory of decline for a given individual with advanced COPD is challenging, the primary indicators that the patient is approaching the end-of-life are: a) poor functional status (Medical Research Council dyspnea scale 4 to 5); b) severe acute exacerbation; c) FEV1 less than 30% predicted; d) signs of respiratory failure or pulmonary hypertension; e) body mass index of less than 20kg/m², or f) the patient is starting to wish for or talk about death. Deteriorating psychosocial/cognitive status and a pattern of increasing health care utilization are also useful indicators. Ongoing and focused monitoring (including the use of functional status scales such as the Palliative Performance Scale and the Bode Index) have prognostic value and should be used in both in patient and home care settings

3. Advocating for patient and caregiver preferences as to the site of end-of-life care

- The specific location of both care and death is less important for persons with advanced COPD than implementing end-of-life care in a setting of their choice that accommodates both the patient's and caregiver's unique needs and preferences. The ability to access both inpatient and home support is a critical indicator of the quality of end-of-life care for people with advanced COPD. Alternative settings such as day hospices that may supplement care and relieve caregiver burden need to be explored.

4. Optimizing interdisciplinary team care

- End-of-life care is optimized through continuity of direct care providers and access to an interdisciplinary team. Knowledgeable family physicians, nurse practitioners and case managers are the foundation of quality end-of-life care. Family physicians and home care teams should have access to the resources of both respiratory disease specialists and palliative care teams.
- Enhanced collaboration among respiratory care providers and palliative care services will optimize quality of care. While palliative care specialists have an important role in consulting to provide symptom management family physicians, respiratory specialists and home care providers must be trained to provide quality end-of-life care. Patients and families need clarification about the roles of each team member.
- Specific initiatives designed to optimize end-of-life care for people with advanced COPD must be evaluated. These initiatives include 24 h emergency response teams for community-based patients (including same-day in-home response), dedicated case managers, system navigator models, rapid access to respite and palliative care beds in nursing homes and hospitals, and access to outpatient symptom management clinics. A strong evidence base, generated by high-quality research for best practices in end-of-life care for this population, must be supported by appropriate and sustainable funding.

5. Selecting interventions for patients with advanced COPD

- Subjective symptom assessments (eg, Edmonton Symptom Assessment Scale) need to be routinely conducted in a consistent manner. Multidisciplinary interventions must address the whole person and include psychosocial, spiritual and existential dimensions. Screening for depression, fatigue, anxiety and caregiver burden, as well as appropriate interventions to alleviate these concerns, are critical. The use of opioids to manage dyspnea at the end-of-life may be a beneficial intervention. Interventions designed to enhance exercise tolerance, nutritional status or treat infection must be considered.
- Interventions that may be detrimental to the quality of life of people with advanced COPD include sustained mechanical ventilation, 'emergency decisions' about life-sustaining therapies and cardiopulmonary resuscitation.

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March 2005

Nursing Best Practice Guideline

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*This program is funded by the
Government of Ontario*



0-920166-72-5



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