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Nursing Best Practice Guideline
Shaping the future of Nursing

Adult Asthma Care Guidelines for Nurses: Promoting Control of Asthma



RNAO

Registered Nurses
Association
of Ontario

L'Association des infirmières
et infirmiers autorisés de
l'Ontario



Greetings from Doris Grinspun
Executive Director
Registered Nurses Association of Ontario

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 Ontario Ministry of Health and Long-Term Care recognized RNAO's ability to lead this project and is providing multi-year funding. Tazim Virani–NBPG project director–with her fearless determination and skills, is moving the project 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, MScN, PhD (candidate)

Executive Director
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How to Use this Document

This nursing best practice guideline is a comprehensive document that provides resources necessary to support evidence-based nursing practice related to the control of asthma in adults. Specifically, this guideline focuses on assisting nurses working in diverse practice settings in providing basic asthma care for adults and contains recommendations for Registered Nurses and Registered Practical Nurses on best nursing practices in the key interventions of assessment, education and referral.

While best practice guidelines represent a statement of best practice based on the best available evidence, they are not intended to be applied in a ‘cookbook fashion’ and replace the nurse’s judgment for the individual client. 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.

Nurses, other healthcare professionals and administrators, who are leading and facilitating practice changes, will find this document valuable for the development of such things as policies, procedures, protocols, educational programs, assessment and documentation tools. It is highly recommended that practice settings adapt these guidelines in formats that would meet local needs. This guideline provides some suggested formats for such local adaptation and tailoring.

Organizations wishing to use this 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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Adult Asthma Care Guidelines for Nurses: Promoting Control of Asthma

Disclaimer

These best practice guidelines are related only to nursing practice and not intended to take into account fiscal efficiencies. These guidelines are not binding for nurses and their use should be flexible to accommodate client/family wishes and local circumstances. They neither constitute a liability or discharge from liability. While every effort has been made to ensure the accuracy of the contents at the time of publication, neither the authors nor RNAO give any guarantee as to the accuracy of the information contained in them, nor accept any liability, with respect to loss, damage, injury or expense arising from any such errors or omissions in the contents of this work. Any reference throughout the document to specific pharmaceutical products as examples does not imply endorsement of any of these products.

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Summary of Recommendations

	RECOMMENDATION	*LEVEL OF EVIDENCE
Assessment of Asthma Control	1.0 All individuals identified as having asthma, or suspected of having asthma, will have their level of asthma control assessed by the nurse.	
	1.1 Every client should be screened to identify those most likely to be affected by asthma. As part of the basic respiratory assessment, nurses should ask every client two questions: <ul style="list-style-type: none"> ■ Have you ever been told by a physician that you have asthma? ■ Have you ever used a puffer/inhaler or asthma medication for breathing problems? 	Level IV
	1.2 For individuals identified as having asthma or suspected of having asthma, the level of asthma control should be assessed by the nurse. Nurses should be knowledgeable about the acceptable parameters of asthma control, which are: <ul style="list-style-type: none"> ■ use of inhaled short-acting β_2 agonist <4 times/week (unless for exercise); ■ experience of daytime asthma symptoms <4 times/week; ■ experience of night time asthma symptoms <1 time/week; ■ normal physical activity levels; ■ no absence from work or school; and ■ infrequent and mild exacerbations. 	Level IV
	1.3 For individuals identified as potentially having uncontrolled asthma, the level of acuity needs to be assessed by the nurse and an appropriate medical referral provided, i.e., urgent care or follow-up appointment.	Level IV
Asthma Education	2.0 Asthma education, provided by the nurse, must be an essential component of care.	
	2.1 The client's asthma knowledge and skills should be assessed and where gaps are identified, asthma education should be provided.	Level I

* See pg. 16 for details regarding "Interpretation of Evidence".

	RECOMMENDATION	LEVEL OF EVIDENCE
	<p>2.2 Education should include as a minimum, the following:</p> <ul style="list-style-type: none"> ■ basic facts about asthma; ■ roles/rationale for medications; ■ device technique(s); ■ self-monitoring; and ■ action plans. 	Level IV
Action Plans	<p>3.1 Every client with asthma should have an individualized asthma action plan for guided self-management based on evaluation of symptoms with or without peak flow measurement, developed in partnership with a healthcare professional.</p>	Level I
	<p>3.2 For every client with asthma, the nurse needs to assess for use and understanding of the asthma action plan. If a client does not have an action plan, the nurse needs to provide a sample action plan, explain its purpose and use, and coach the client to complete the plan with his/her asthma care provider.</p>	Level V
	<p>3.3 Where deemed appropriate, the nurse should assess, assist and educate clients in measuring peak expiratory flow rates. A standardized format should be used for teaching clients how to use peak flow measurements.</p>	Level IV
Medications	<p>4.0 Nurses will understand and be able to discuss with clients their medications.</p>	
	<p>4.1 Nurses will understand and be able to discuss the two main categories of asthma medications (controllers and relievers) with their clients.</p>	Level IV
	<p>4.2 All asthma clients should have their inhaler/device technique assessed by the nurse to ensure accurate use. Clients with sub-optimal technique will be coached in proper inhaler/device use.</p>	Level I

	RECOMMENDATION	LEVEL OF EVIDENCE
Referrals	5.0 The nurse will facilitate referrals as appropriate.	
	5.1 Clients with poorly controlled asthma should be referred to their physician.	Level II
	5.2 All clients should be offered links to community resources.	Level IV
	5.3 Clients should be referred to an asthma educator in their community, if appropriate and available.	Level IV
Education Recommendations	6.0 Nurses working with individuals with asthma must have the appropriate knowledge and skills to: <ul style="list-style-type: none"> ■ identify the level of asthma control; ■ provide basic asthma education; and ■ conduct appropriate referrals to physician and community resources. 	Level IV
Organization and Policy Recommendations	7.0 Organizations should have available placebos and spacer devices for teaching, sample templates of action plans, educational materials, and resources for client and nurse education and where indicated, peak flow monitoring equipment.	Level IV
	8.0 Organizations must promote a collaborative practice model within an interdisciplinary team to enhance asthma care.	Level IV
	9.0 Organizations need to ensure that a critical mass of health professionals are educated and supported to implement the asthma best practice guidelines in order to ensure sustainability.	Level V
	10.0 Agencies and funders need to allocate appropriate resources to ensure adequate staffing and a positive healthy work environment.	Level V

	RECOMMENDATION	LEVEL OF EVIDENCE
	<p>11.0 Nursing best practice guidelines can be successfully implemented only when there are adequate planning, resources, organizational and administrative support, and appropriate facilitation. Organizations may 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 <i>Toolkit</i> is recommended for guiding the implementation of <i>Adult Asthma Care Guidelines for Nurses – Promoting Control of Asthma</i>.</p>	Level IV

Interpretation of Evidence

The recommendations made in this best practice guideline have been critically reviewed and categorized by level of evidence. The following taxonomy provides the definitions of the levels of evidence and the rating system (Boulet et al., 1999).

LEVEL I	Evidence is based on randomized controlled trials (or meta-analysis of such trials) of adequate size to ensure a low risk of incorporating false-positive or false-negative results.
LEVEL II	Evidence is based on randomized controlled trials that are too small to provide Level I evidence. They may show either positive trends that are not statistically significant or no trends and are associated with a high risk of false-negative results.
LEVEL III	Evidence is based on non-randomized controlled or cohort studies, case series, case-control studies or cross-sectional studies.
LEVEL IV	Evidence is based on the opinion of respected authorities or expert committees as indicated in published consensus conferences or guidelines.
LEVEL V	Evidence is based on the opinions of those who have written and reviewed the guideline, based on their experience, knowledge of the relevant literature and discussion with their peers.

Responsibility for Development

The Registered Nurses Association of Ontario (RNAO), with funding from the Ministry of Health and Long-Term Care, has embarked on a multi-year project of nursing best practice guideline development, pilot implementation, evaluation and dissemination. In this third cycle of the project, one of the areas of emphasis is on the assessment and management of asthma in adults. This guideline was developed by a panel of nurses and researchers convened by the RNAO, conducting its work independent of any bias or influence from the Ministry of Health and Long-Term Care.

Purpose and Scope

The purpose of this best practice guideline is to provide nurses (RNs and RPNs) working in diverse settings with an evidence-based summary of basic asthma care for adults. The guideline aims to assist nurses and their clients to make informed decisions that lead to quality care and improved outcomes (improved quality of life and overall reduction in morbidity). It is not the intent of the best practice guideline to provide a comprehensive review of the literature or duplicate the recommendations of the Canadian Asthma Consensus Report. Rather, this document is designed to complement and expand upon existing guidelines. This best practice guideline assists nurses who are not specialists in asthma care to identify adults with asthma, determine whether or not their asthma is under acceptable control, provide asthma education (specifically, self-management action plans, use of inhaler/devices and medications), facilitate appropriate referral(s), and access community resources. It is acknowledged that successful asthma control involves a partnership with the individual with asthma and the interdisciplinary healthcare team.

Key Points

- This document focuses on assisting nurses working in diverse practice settings in providing basic asthma care.
- Nurses have an important role in promoting control of asthma through assessment, education and referral.

Guideline Development Process

In February of 2001, a panel of nurses and researchers with expertise in asthma care, asthma education and asthma research, from institutional, community and academic settings was convened under the auspices of the RNAO. The panel discussed the purpose of their work, and came to consensus on the scope of the best practice guideline. Subsequently, a search of the literature for clinical practice guidelines, systematic reviews, relevant research articles and websites was conducted. See Appendix A for a detailed outline of the search strategy employed.

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Several published international guidelines have systematically reviewed the evidence related to asthma. The adult asthma best practice development panel determined that it was not necessary to repeat a review of all the literature and that existing guidelines would serve as a “foundation” for guideline development.

A total of ten existing clinical practice guidelines for the assessment and management of asthma in adults were identified that met the initial inclusion criteria:

- published in English;
- developed in 1995 or later;
- strictly on the topic of asthma;
- evidence-based (or documentation of evidence); and
- accessible as a complete document.

Members of the development panel critically appraised these ten guidelines using the “Appraisal Instrument for Clinical Guidelines” from Cluzeau et al. (1997). This instrument allows for evaluation in three key dimensions: rigour, content and context, and application. Following the appraisal process, several guidelines were dropped due to low rigour scores (< 20% of criteria met). Guidelines that were identified as being developed in a systematic way, so that their recommendations were reliably and explicitly evidence-based, were selected as “foundation” guidelines. These documents included:

Boulet, L. P., Becker, A., Bérubé, D., Beveridge, R., & Ernst, P. (1999). *Canadian asthma consensus report*. [Online]. Available: www.cmaj.ca/cgi/reprint/161/11_suppl_1/s1.pdf

Green, L., Baldwin, J., Grum, C., Erickson, S., Hurwitz, M., & Younger, J. (2000). *UMHA asthma guideline*. University of Michigan Health System [Online]. Available: www.guideline.gov

Institute for Clinical Systems Improvement (2001). *Health care guideline: Diagnosis and management of asthma. ICSI Health Care Guideline*. [Online]. Available: www.ICSI.org/guidelist.htm#guidelines

National Institutes of Health (1997). *Guidelines for the diagnosis and management of asthma* (Rep. No. 2). NIH Publication. [Online]. Available: www.nhlbi.nih.gov/guidelines/asthma/asthgdln.htm

Scottish Intercollegiate Guidelines Network (1996). *Hospital in-patient management of acute asthma attacks – SIGN 6*. [Online]. Available: www.show.scot.nhs.uk/sign/home.htm

Scottish Intercollegiate Guidelines Network (1998). *Primary care management of asthma – SIGN 33*. [Online]. Available: www.show.scot.nhs.uk/sign/home.htm

Scottish Intercollegiate Guidelines Network (1999). *Emergency management of acute asthma – SIGN 38*. [Online]. Available: www.show.scot.nhs.uk/sign/home.htm

The recommendations from the seven foundation guidelines were compared in a summary document using the following subheadings:

1. Criteria of control, optimal ranges, acceptable ranges.
2. Mild, moderate, and severe asthma.
3. Medication management – what, how often – adjusted to symptom control.
4. Monitoring, assessment, education, follow-up.
5. Education/Self-management, basic survival skills.
6. Indications for referral and follow-up – asthma centre/specialists.
7. Contextual – education of nurses.

Following the extraction of identified recommendations and content from the seven guidelines, the panel underwent a process of review, discussion and consensus on the key evidence-based assessment criteria and levels of severity and control, ultimately identifying key subtopic areas for nursing intervention recommendations.

The panel members divided into subgroups to develop draft recommendations for these key nursing interventions. This work included a critical review of the selected literature by the member(s) of the working group, including review of the foundation guidelines, systematic review articles, primary research studies and other supporting literature for the purpose of drafting recommendations. Where evidence was available from randomized controlled trials and systematic reviews, recommendations were based on these data. Where there was a lack of evidence from high quality studies, recommendations were based on the best available evidence or expert opinion. This process yielded an initial set of recommendations, which were reviewed by the entire development panel for potential gaps and need for supporting evidence, leading to consensus on a final draft set of recommendations. Recommendations were only advanced where consensus was achieved.

This draft document was submitted to a set of external stakeholders for review and feedback – a listing and acknowledgement of these reviewers is provided at the front of this document. Stakeholders represented various healthcare professional groups, clients and families, as well as professional associations. External stakeholders were asked to provide feedback using a questionnaire consisting of open and closed-ended questions. The results were compiled and reviewed by the development panel – discussion and consensus resulted in minor revisions to the draft document prior to pilot testing.

A pilot implementation practice setting was identified through a “Request for Proposal” (RFP) process. Practice settings in Ontario were asked to submit a proposal if they were interested in pilot testing the recommendations of the guideline. The proposals underwent an external review process and the successful applicant (practice setting) selected. A nine-month pilot was undertaken to test and evaluate the recommendations for practice in a community-based hospital setting (Mississauga, Ontario).

The development panel reconvened following completion of the pilot to review the experiences of the pilot site, consider the evaluation results and review any new literature published since the initial development phase. All these sources of information were used to update and revise the document prior to publication.

Three new clinical practice guidelines focusing on adult asthma had been published since the initial development phase. To ensure congruency with the development methodology, development panel members appraised these documents using the revised version of the Cluzeau (1997) instrument, the “Appraisal of Guidelines for Research and Evaluation (AGREE) Instrument” (2001). All three guidelines were determined to meet the panel’s criteria for rigour, content and context, and applicability, and were included as resources for the revision phase. These documents included:

British Thoracic Society and the Scottish Intercollegiate Guidelines Network (2003). *British guideline on the management of asthma*. [Online]. Available: www.sign.ac.uk/pdf/sign63.pdf

Global Initiative for Asthma (2002). *Global strategy for asthma management and prevention*. [Online]. Available: www.ginasthma.com

New Zealand Guideline Group (2002). *Best practice evidence-based guideline. The diagnosis and treatment of adult asthma*. [Online]. Available: www.nzgg.org.nz/library/gl_complete/asthma/full_text_guideline.pdf

Definition of Terms

For clinical terms not identified here, please refer to the Glossary of Terms, Appendix B.

Action Plan: A collaboratively written set of instructions that assists the client to adjust their asthma medication and/or to seek medical attention according to their level of symptoms and/or peak flow rate in order to maintain control.

Asthma: A chronic inflammatory disorder of the airways. Airway inflammation contributes to airway hyperresponsiveness, airflow limitation, and recurrent episodes of wheeze, cough, shortness of breath, and chest tightness. These episodes are usually associated with airflow obstruction that is reversible either spontaneously or with treatment. Airway inflammation contributes to airflow obstruction by causing bronchoconstriction, airway edema, mucous plug formation, and airway wall remodeling.

Asthma Management: Establishing and maintaining control of a person's asthma includes education, environmental control measures, appropriate medications, action plans and regular follow-up care.

Certified Asthma Educator (CAE): The national certification for asthma educators in Canada, which ensures a common set of technical and teaching competencies. There are two integral aspects of education included in the Certified Asthma Educators certification: current knowledge about asthma, and educational theory and behaviour change process.

Chronic Obstructive Pulmonary Disease (COPD): A term that incorporates chronic bronchitis and emphysema, which can occur singularly or in combination. In Canada, this term does not include asthma. Asthma and COPD can co-exist.

Clinical Practice Guidelines or Best Practice Guidelines: Systematically developed statements that assist clinicians and patients to make decisions about appropriate management and healthcare use for specific clinical (practice) circumstances.

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 research data or the collective knowledge of participants.

Control of Asthma: Acceptable asthma control is defined by the following parameters: use of inhaled short-acting β_2 agonist <4 times/week (unless for exercise); experience of day-time asthma symptoms <4 times/week; experience of night time asthma symptoms <1 time/week; normal physical activity level; no absence from work or school; and infrequent and mild exacerbations.

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

Meta-analysis: Results from several studies, identified in a systematic review, that are combined and summarized quantitatively.

Organization and 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 ideally evidence-based.



Background Context

Overview

Asthma is one of the most prevalent chronic conditions affecting 2.3 million Canadians over the age of 4 years (Statistics Canada, 2000), with an estimated total cost of between \$504 million and \$648 million in 1991 (Krahn et al., 1996).

According to the latest statistics, almost 1 million Ontarians aged 4 years and older have been diagnosed with asthma (Statistics Canada, 2000). A significant increase in the prevalence of asthma in Ontario has occurred in recent years – from 7.4% of those aged 4 and older in 1994/95 to 8.9% in 1998/99 (Statistics Canada, 2000).

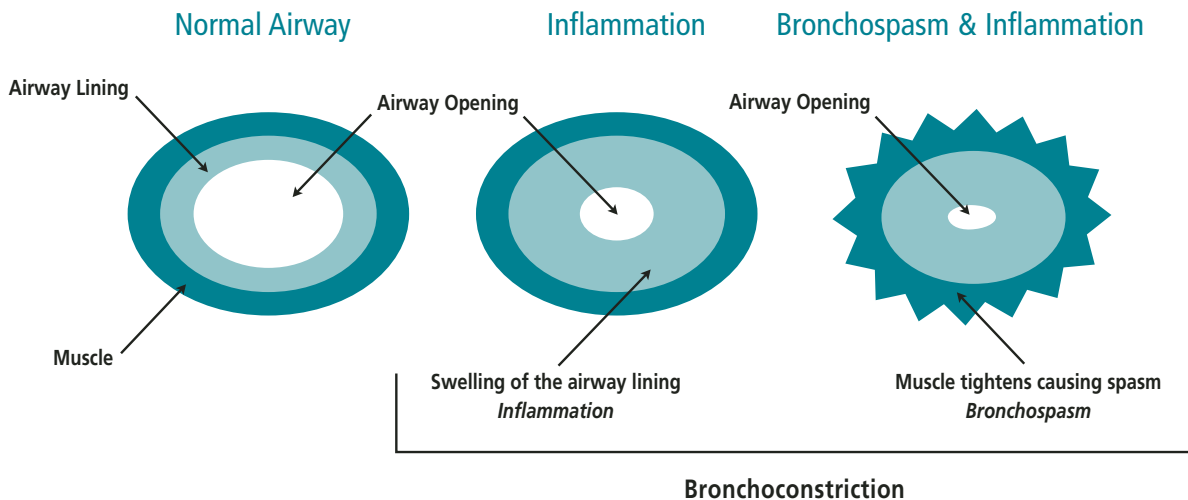
Although most people with asthma can achieve good asthma control, many do not. Many underestimate the severity and control of their asthma and continue to restrict their everyday activities, and suffer needlessly. Proper asthma management can lead to better asthma control and may reduce the incidence of death from asthma by as much as 80% (Institute for Clinical Evaluative Sciences in Ontario, 1996). These increases in the prevalence of asthma and associated morbidity and cost are occurring despite advances in our understanding and treatment.

What Is Asthma?

Asthma is a chronic inflammatory disorder of the airways characterized by an increase in airway responsiveness and airway narrowing, which leads to difficulty in breathing. Asthma is usually classified as mild, moderate or severe. Although symptoms vary from person to person, common symptoms include shortness of breath, chest tightness, wheezing, and/or coughing.

Asthma episodes may begin suddenly or may have a slow onset with a gradual worsening of symptoms. These episodes can last for a few minutes to several days, and are attributed to a hyperresponsiveness of the airways and are typically reversible (The Lung Association, 2000). The pathology of an asthma episode is depicted in the figures below. The first illustrates the normal airway. When individuals with asthma are exposed to triggers that they are sensitive to, the airway narrows. This narrowing develops in one or two ways:

- The airway becomes swollen and plugged with mucous (inflammation), thus making the airway opening considerably smaller. This is depicted in the middle picture. This inflammation can last from a few hours to a few days to a lifetime.
- The muscles surrounding the airway tighten and go into spasm (bronchospasm). The picture on the right demonstrates this process.



Regardless of the person's asthma severity, any loss of asthma control can potentially be life-threatening. The goal of asthma care is to control or prevent the airway inflammation and to minimize the symptoms experienced and interruptions to daily life. Components of asthma management include education, environmental control measures, appropriate medications, action plans, establishing a partnership between the client and provider and regular follow-up care.

Key points

- Asthma is a chronic inflammatory disorder of the airways
- Typical symptoms include shortness of breath, chest tightness, wheezing and/or coughing.
- Airflow limitation in asthma is reversible.
- The severity of an asthma episode can range from mild to life-threatening and last from minutes to days.

What causes asthma?

Although the exact cause of asthma is not known, several predisposing factors have been implicated in its development. These include atopy – a greater tendency to have allergic reactions to environmental allergens (Sporik et al., 1990); genetics – a family history of asthma and/or atopy (Larsen, 1992; Millar & Hill, 1998); and exposure to environmental tobacco smoke (Arshad, 1992; Cook & Strachan, 1997; Soyseth, Kongerud & Boe, 1995; Stoddard & Miller, 1995).

There are several triggers that may irritate the hypersensitive airways in people with asthma and provoke an asthma episode. Common triggers include:

a) Irritants such as:

- **Tobacco smoke** (BTS/SIGN, 2003; Boulet et al., 2001, 1999; Chilmonczyk, Salmun & Megathlin, 1993; GINA, 2002; Murray & Morrison, 1986; Murray & Morrison, 1989; NIH, 1997; NZGG, 2002; United States Environmental Protection Agency, 1992);
- **Exercise⁺** (American Academy of Allergies, Asthma, and Immunology et al., 1999; Boulet et al., 1999; GINA, 2002; NZGG, 2002);
- **Exposure to work-related agents or indoor chemicals** (American Academy of Allergy, Asthma, and Immunology et al., 1999; Boulet et al., 1999; Egan, 1985; GINA, 2002; NIH, 1997; NZGG, 2002; Packe, Archer & Ayres, 1983; Salvaggio et al., 1970; Usetti et al., 1983; Virchow et al., 1988); **and**
- **Outdoor pollutants** (BTS/SIGN, 2003; Boulet et al., 1999; Burnett et al., 1995; Cody, Weisel, Birnbaun & Lioy, 1992; Delfino, 1994; GINA, 2002; Hoek & Brunekreef, 1995; NIH, 1997; NZGG, 2002; Pope, 1989; Pope, 1991; Rennick & Jarman, 1992; Roemer, Hock & Brunekreef, 1993; Schwartz, Slater, Larson, Pierson & Koenig, 1993).

b) Allergens such as:

- **Pollen** (GINA, 2002; NZGG, 2002; Peat et al., 1993; Suphioglu et al., 1992);
- **Moulds** (GINA, 2002; Hide et al., 1994; NIH, 1997; Zacharasiewicz et al., 1999);
- **Dust mites** (BTS/SIGN, 2003; Boulet et al., 2001; Chapman, Heymann, Wilkins, Brown & Platts-Mills, 1987; GINA, 2002; Kuehr et al., 1995; Marks et al., 1995; NIH, 1997; NZGG, 2002; Platts-Mills, Hayden, Chapman & Wilkins, 1987);
- **Pet dander** (BTS/SIGN, 2003; Boulet et al., 2001; Gelber et al., 1993; GINA, 2002; Kuehr et al., 1995; Millar & Hill, 1998; NIH, 1997; NZGG, 2002; Pollart, 1989; Sears et al., 1993; Sporik et al., 1995; Strachan & Carey, 1995; Warner et al., 1990);
- **Foods or food additives** (Freedman, 1977; GINA, 2002; Lee, 1992; NZGG, 2002; Taylor, Sears & van Herwaarden, 1994); **and**
- **Cockroach allergen** (Boulet et al., 2001; GINA, 2002; NIH, 1997; Rosenstreich et al., 1997).

+ Despite its potential to be a trigger, with a proper warm up, people with exercise-induced asthma should be able to engage in physical activity (Boulet et al., 1999).

c) Other factors that can trigger or worsen asthma severity:

- Upper respiratory/viral infections (Boulet et al., 1999; GINA, 2002; Lemanske, 1989; NIH, 1997; NZGG, 2002; Pattemore, Johnston & Bardin, 1992);
- Rhinitis/Sinusitis (Boulet et al., 1999; Corren, Adinoff, Buchmeir & Irvin, 1992; GINA, 2002; Watson, Becker & Simons, 1993);
- Gastroesophageal reflux (GINA, 2002; Irwin et al., 1989; NIH, 1997; Nelson, 1984);
- Sensitivity to aspirin and other nonsteroidal anti-inflammatory drugs (NSAIDS) (GINA, 2002; NIH, 1997; NZGG, 2002; Settipane et al., 1995; Szczeklik & Stevenson, 1999; Sampson, 1999); and
- Topical and systemic beta-blockers (GINA, 2002; NIH, 1997; Odeh, Olivern & Bassan, 1991; Schoene, Abuan, Ward & Beasley, 1984).

Some individuals with asthma may react to only one trigger, others may react to several. Further, an individual's triggers may change over time. It is important for individuals with asthma to know their triggers and the appropriate steps to reduce exposure (Ministry of Health and Long-Term Care, 2000).

Key points

- Common asthma triggers include irritants, allergens, and viral infections.
- Allergic rhinitis, sinusitis or gastroesophageal reflux may aggravate asthma.
- An individual's triggers may change over time.

Prevalence and Impact of Asthma

In Ontario, it is estimated that almost 1 million people (8.9% of the population) over the age of four have asthma (Statistics Canada, 2000). Further, asthma is implicated in at least 155 deaths per year in Ontario (Ministry of Health and Long-Term Care, 2000). An Australian study reported that 45% of people who died from their asthma had been assessed as having mild or moderate asthma (Robertson, Rubinfeld & Bowes, 1990).

Despite medical advances in understanding the disease and the availability of more effective medications, poorly controlled asthma is a significant problem. According to a 2000 national survey (Chapman et al, 2001), more than 6 in 10 individuals with asthma (62%) are poorly controlled – that is, they experienced at least two of the following: daytime symptoms, sleep disturbances, physical activity restrictions, asthma episodes, absenteeism from work or school, and excess use of rescue medication. Similar estimates have been reported for Ontario (Health Canada, 1998).

Our healthcare system is bearing a significant burden in terms of hospitalizations and emergency room visits as a result of poorly controlled asthma. According to the National Population Health Survey 1996-1997 (Statistics Canada, 2000) 18% of people with asthma had visited the emergency department at least once in the past year. In Ontario, 65,109 days spent in hospital were attributed to poorly controlled asthma, costing the healthcare system \$44,432,300 (Statistics Canada, 2000). These costs do not factor in other direct costs of the illness, such as physician visits and costs of medications, nor indirect costs, such as disability, absence from school or work, costs related to premature deaths, and traveling expenses to and from hospital. Although total figures for Ontario have not been tabulated, a 1995/1996 study to assess the annual cost of asthma in adult clients in south central Ontario concluded that the unadjusted annual costs were \$2,550 per client (Ungar, Coyte, Chapman & MacKeigan, 1998). Multiplying this estimate by approximately 1 million asthmatics in Ontario, it is estimated that over 2.5 billion dollars per year is spent in Ontario on asthma management.

The burden of poorly controlled asthma for the individual is difficult to estimate since a significant number of cases may go unreported and/or undiagnosed. In Ontario, 31% of individuals with asthma reported missing school, work, and/or social functions due to their asthma (ICES, 1996). Even if the individual with asthma is able to attend work or school, ongoing symptoms or medication may alter concentration and performance (National Asthma Control Task Force, 2000).

Key Points

- Almost 1 million people in Ontario have been diagnosed with asthma.
- 6 in 10 individuals with asthma are poorly controlled.
- Asthma is implicated in 155 deaths per year in Ontario.
- Most asthma related deaths are preventable.
- Annual costs in Ontario for asthma may be as high as 2.5 billion dollars per year.

Gaining Control Over Asthma

Reducing the burden of asthma requires a greater understanding of why the prevalence of poorly controlled asthma is so high. Despite a high prevalence of uncontrolled asthma, Chapman et al. (2001) noted that most clients (91%) believe that their asthma is adequately controlled, while only 24% of those studied achieved disease control by meeting the six symptom-based criteria listed by the Canadian Asthma Consensus Report (1999). One-half (48%) of patients with poorly controlled asthma who used inhaled steroids did not understand the role of inhaled steroids and one-third (32%) of patients with poorly controlled asthma who used short acting bronchodilators misunderstood the action of quick relief bronchodilators.

The study concluded that people with asthma have:

- low expectations about their asthma control;
- a poor understanding of the role of various medications; and
- learned to live with and tolerate symptoms and limitations that are generally avoidable.

In addition, the survey highlighted that physicians were no better than their clients with asthma regarding the perception of asthma control (Chapman et al., 2001).

Proper care of asthma including education, environmental control measures, appropriate medications, action plans and regular follow-up care leads to optimal asthma control, improved quality of life for individuals with asthma and reduces the burden of healthcare costs. Because nurses are in contact with clients with asthma in a multitude of settings, they are in a unique situation to promote asthma control, identify early indicators of poorly controlled asthma, positively influence self-care practices and facilitate the referral of individuals to community resources and specialized care.

Key Points

- Most individuals with asthma accept poorly controlled asthma as normal or do not recognize that their asthma is out of control.
- Many physicians are not aware when their clients' asthma is out of control.
- Best Practice Guidelines for nurses are needed to improve understanding and management of asthma.

Practice Recommendations

Assessment of Asthma Control

Recommendation • 1.0

All individuals identified as having asthma, or suspected of having asthma, will have their level of asthma control determined by the nurse.

Recommendation • 1.1

Every client should be screened to identify those most likely to be affected by asthma. As part of the basic respiratory assessment, nurses should ask every client two questions:

- Have you ever been told by a physician that you have asthma?
- Have you ever used a puffer/inhaler or asthma medication for breathing problems?

(Level IV)

Recommendation • 1.2

For individuals identified as having asthma or suspected of having asthma, the level of asthma control should be assessed by the nurse. Nurses should be knowledgeable about the acceptable parameters of asthma control, which are:

- use of inhaled short-acting β_2 agonist < 4 times/week (unless for exercise);
- experience of daytime asthma symptoms < 4 times/week;
- experience of night time asthma symptoms < 1 time/week;
- normal physical activity levels;
- no absence from work or school; and
- infrequent and mild exacerbations. *(Level IV)*

Indicators of Acceptable Asthma Control

Parameter	Frequency/Value
Daytime symptoms	< 4 times/week
Night-time symptoms	< 1 time/week
Need for short-acting β_2 agonist	< 4 times/week
Physical activity	Unaffected
Exacerbations	Mild, infrequent
Work/school absence	None
FEV ₁ or PEF rate	> 85% personal best
PEF diurnal variation	< 15% variation

Adapted from Canadian Asthma Consensus Report (1999, 2001)

If any one parameter exceeds the described frequency/value, then the client may have uncontrolled asthma.

Recommendation • 1.3

For individuals identified as potentially having uncontrolled asthma, the level of acuity needs to be assessed by the nurse and an appropriate medical referral provided, i.e., urgent care or follow-up appointment. (Level IV)

Indicators for Immediate Medical Attention

The following criteria should be assessed and supplemented by spirometry, if available (BTS/SIGN, 2003; NZGG, 2002; SIGN, 1999):

- respiration rate greater than 25 breaths/min (Level III);
- pulse greater than 110 beats/min (Level III);
- accessory muscle use (Level III);
- unable to complete a sentence between breaths (Level III);
- person is distressed (fatigue, exhaustion) and agitated (if person says they are in trouble or anxious, or have an impending sense of doom) (Level III);
- confusion (Level III); and
- altered level of consciousness (Level III).

If the client exhibits any one of the above symptoms, then they should be referred for immediate medical attention.

Discussion of Evidence

Several sources confirm an epidemic of poorly controlled asthma (Chapman et al., 2001; Health Canada, 1998; Statistics Canada, 2000). It is essential that individuals at risk of having poorly controlled asthma be identified and their asthma control assessed (Boulet et al., 1999). If any one of the indicators for immediate medical attention is present, clients may be at increased risk of dying (BTS/SIGN, 2003; NZGG, 2002; SIGN, 1999). See Appendix C for individual questions to assess level of asthma control, and a flow-chart of the process.

Note: It is important to mention that the initial screening questions recommended in the respiratory assessment to identify individuals with asthma or at risk of having asthma may also identify those with or at risk of having Chronic Obstructive Pulmonary Disease (COPD). The initial assessment questions are not meant to diagnose or differentiate between asthma and COPD. Establishing the diagnosis of COPD and/or asthma requires pulmonary function testing and cannot be based on history alone. Asthma and COPD can present similarly in terms of symptom experience (cough, dyspnea, shortness of breath) and medications used to manage the conditions (bronchodilators and corticosteroids). In addition, individuals can have both asthma and COPD, causing diagnostic confusion for clients and clinicians.

Asthma Education

Recommendation • 2.0

Asthma education, provided by the nurse, must be an essential component of care.

Recommendation • 2.1

The client's asthma knowledge and skills should be assessed and where gaps are identified, asthma education should be provided. *(Level I)*

Recommendation • 2.2

Education should include as a minimum, the following:

- basic facts about asthma;
- roles/rationale for medications;
- device technique(s);
- self-monitoring; and
- action plans. *(Level IV)*

Basic facts about asthma

- normal versus asthmatic airways;
- what happens during an asthma episode;
- signs and symptoms of control; and
- identification and reduction of triggers.

Roles/rationale for medications (see Appendix D and J)

- when to use reliever (short-term relief) versus controller (long-term control); and
- importance of adherence to prescribed medication.

Device technique(s) (see Appendix E, H and I)

- good inhaler technique;
- use of spacer; and
- peak flow technique and monitoring (optional).

Self-monitoring and action plan (see Appendix F and G)

- what it is and how to use it.

Discussion of Evidence

A number of controlled trials and systematic reviews with and without meta-analysis have consistently demonstrated that asthma education programs improve asthma morbidity and quality of life and reduce healthcare utilization. Asthma education can also be cost effective (Allen, Jones, & Oldenburg, 1995; Bailey et al., 1990; Bolton et al., 1991; Clark & Nothwehr, 1997; Clarke et al., 1986; Côté et al., 2001; Devine, 1996; Fireman et al., 1981; Garrett et al., 1994; Gibson et al., 2003; Hindi-Alexander & Cropp., 1984; Ignacio-Garcia & Gonzalez-Santos, 1995; Lewis et al., 1984; Trautner et al., 1993; Windsor et al., 1990).

The effectiveness of the specific components of asthma education programs has not been empirically established. However, recommendations from practice guidelines and the literature indicate that basic education should include: facts about asthma, signs and symptoms of worsening asthma, self-monitoring strategies, action plan use, information regarding medications and use of devices (BTS/SIGN, 2003; Boulet et al., 1999; Cicutto et al., 1999; Flaum, Lum Lung & Tinkleman, 1997; GINA, 2002; Gibson et al., 2003; NZGG, 2002).

Comprehensive education programs that include strategies of self-management, regular medical supervision and written action plans are associated with better asthma outcomes than programs offering information only (Gibson et al., 2003). Asthma education programs need to use a diverse range of educational strategies and methods (Boulet et al., 1999). Wilson et al.

(1993), in a controlled trial evaluating two forms of asthma self-management education for adults, reported that education provided in groups or individual counseling both showed significant benefits but no difference in outcomes. The group sessions tended to be more cost effective.

Patient adherence is an important factor in the effectiveness of treatment regimes for any chronic illness (Baudinette, 2000). Evidence suggests that non-adherence with medication and treatment plans is a serious problem among people with asthma (Rand, 1998). As many as fifty percent of people with asthma don't follow their prescribed treatment – even individuals who have some understanding of appropriate management strategies have difficulty with adherence (Kolbe et al, 1996). Refer to Appendix J for tips related to improving adherence.

Action Plans

Recommendation • 3.1

Every client with asthma should have an individualized asthma action plan for guided self-management based on evaluation of symptoms with or without peak flow measurement, developed in partnership with a healthcare professional. *(Level I)*

Recommendation • 3.2

For every client with asthma, the nurse needs to assess for use and understanding of the asthma action plan. If a client does not have an action plan, the nurse needs to provide a sample action plan, explain its purpose and use, and coach the client to complete the plan with his/her asthma care provider. *(Level V)*

Recommendation • 3.3

Where deemed appropriate, the nurse should assess, assist and educate clients in measuring peak expiratory flow rates. A standardized format should be used for teaching clients how to use peak flow measurements. *(Level IV)*

Discussion of Evidence

The Canadian Asthma Consensus Report (Boulet et al., 1999, 2001), along with other national and international guidelines, recommend that every individual with asthma be provided with a written action plan (BTS/SIGN, 2003; Boulet et al., 1999, 2001; GINA, 2002; NIH, 1997; SIGN, 1998; NZGG, 2002). It is the role of the nurse to facilitate the attainment and effective use of an individualized action plan developed in partnership with the physician and the rest of the asthma care team. This recommendation is based on a substantive amount of evidence. A Cochrane review (Gibson et al., 2003) concluded that self-management programs for adults with asthma that involved self-monitoring, either by peak flow or symptoms, combined with a written action plan and regular medical review resulted in reduced health services use, days lost from work, and episodes of nocturnal asthma. It is noteworthy that the programs that included a written action plan consistently demonstrated benefit whereas those that did not include a written action plan did not always demonstrate benefit. Recently, a case control study was published that reported a 70% reduction in the risk of death for individuals who possessed written action plans (Abramson et al., 2001).

Refer to Appendix F for details about action plans, Appendix G for sample action plans, and Appendix H and I for details regarding the use of Peak Flow Meters.

Peak Flow versus Symptom Monitoring

Studies comparing peak flow monitoring with self-monitoring of symptoms have reported little difference in various asthma outcomes (Charlton, Charlton, Broomfield, & Mullee, 1990; Gibson, Coughlan, Abramson, 1998; Turner, Taylor, Bennett, & Fitzgerald, 1998). However, much debate has focused on the desired method for self-monitoring, specifically peak expiratory flow (PEF) monitoring versus symptom monitoring only. Peak flow measurements provide an objective measurement of lung function, but such measurements have limitations. Côté et al. (1998) have demonstrated that individuals with asthma have difficulty sustaining daily performance and recording of peak flow use. There is also a risk of inaccurate readings resulting from poor technique, misinterpretation of results or device failure (Boulet et al., 1999). Further, several research findings indicate that changes in peak flow are less sensitive than deterioration of symptoms during acute episodes of asthma (Chan-Yeung et al., 1996; Gibson et al., 1990; Malo, L'Archeveque, Trudeau, d'Aquino & Cartier, 1993). A role for action plans based on the regular measurement

of PEF, however, is suggested in clients who have difficulty recognizing the severity of their symptoms (i.e., ‘poor perceivers’), those with very severe asthma, or those recently requiring emergency department use or hospitalization (Boulet et al., 1999). The choice of peak flow or symptom monitoring may be based on asthma severity, the client’s ability to perceive airflow obstruction, the availability of peak flow meters and, most importantly, client preferences (Boulet et al., 1999; NIH, 1997).

Medications

Recommendation • 4.0

Nurses will understand and be able to discuss with clients their medications.

Recommendation • 4.1

Nurses will understand and be able to discuss the two main categories of asthma medications (controllers and relievers) with their clients. *(Level IV)*

Knowledge of medications includes the following:

- trade and generic names;
- indications;
- doses;
- side effects;
- mode of administration; and
- pharmacokinetics.

Recommendation • 4.2

All asthma clients should have their inhaler/device technique assessed by the nurse to ensure accurate use. Clients with sub-optimal technique will be coached in proper inhaler/device use. *(Level I)*

Discussion of Evidence

Many barriers exist regarding the use of medications that prevent people with asthma from adequately controlling their disease. These include possible knowledge deficits regarding the relationship between asthma symptoms and the mechanism of action of asthma medications, inadequate device technique, the complexity of the medication regime, and negative feelings toward taking medication daily. In order to address some of these barriers, the nurse and individual with asthma should be knowledgeable regarding the general classifications of medications, their indications, actions, side effects, usual doses, and administration techniques (Boulet et al., 1999).

Medications used to treat asthma can generally be divided into two categories, controllers (preventers) and relievers. They are available in various forms and are delivered through a variety of devices. The inhaled route is the preferred route as it minimizes systemic availability and therefore minimizes side effects (BTS/SIGN, 2003; Boulet et al., 1999; GINA, 2002; NZGG, 2002; NIH, 1997; Newhouse & Dolovich, 1986). Appendix D provides a detailed description of controllers (preventers) and relievers.

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Referrals

Recommendation • 5.0

The nurse will facilitate referrals as appropriate.

Recommendation • 5.1

Clients with poorly controlled asthma should be referred to their physician. *(Level II)*

Recommendation • 5.2

All clients should be offered links to community resources. *(Level IV)*

Recommendation • 5.3

Clients should be referred to an asthma educator in their community, if appropriate and available. *(Level IV)*

Discussion of Evidence

Clients may need to be referred to a specialist through their physician if their diagnosis is in doubt or their asthma is not under control (BTS/SIGN, 2003; Boulet et al., 1999; GINA, 2002; Green et al., 2000; NIH, 1997; NZGG, 2002; SIGN, 1998). Evidence suggests asthma is better managed when individuals receive care supplemented by specialists or asthma clinics (BTS/SIGN, 2003; Bartter et al., 1996; Cicutto et al., 2000; Jin et al., 2000; NZGG, 2002; Volmer et al., 1997) as clients are more likely to receive objective lung function measurements, anti-inflammatory therapy, asthma education and regular follow-up care.

Education Recommendations

Recommendation • 6.0

Nurses working with individuals with asthma must have the appropriate knowledge and skills to:

- identify the level of asthma control;
- provide basic asthma education; and
- conduct appropriate referrals to physician and community resources. *(Level IV)*

Specific areas of knowledge and skills include the following:

- assessment of asthma control;
- effective teaching and communication strategies;
- assessment for gaps in knowledge and skills;
- basic components of asthma education;
- asthma medications (see Appendix D);
- inhaler/device technique (see Appendix E);
- purpose for, and the general structure of, an asthma action plan (see Appendix F and G);
- use of peak flow monitoring (see Appendix H and I); and
- available community resources (see Appendix K and L).

Discussion of Evidence

Individuals with asthma need regular supervision and support by healthcare professionals who are knowledgeable about asthma and its management (BTS/SIGN, 2003; Boulet et al., 1999; GINA, 2002; NZGG, 2002). In order to provide the necessary support and education to adults with asthma, nurses who are not specialists in asthma care require basic skills in these identified areas. Education of healthcare providers about asthma best practices should address the knowledge, skill and attitudes necessary to implement the guideline recommendations (NZGG, 2002).

All healthcare professionals working with adults with asthma require basic education, which should include: the content of the clinical practice guidelines; information about asthma; prevention of exacerbations; training in guided self-management; ability to recognize deteriorating asthma; knowledge about medications; training in the proper use of medication inhalers/devices and peak flow meters. This education should emphasize the importance of preventive management. In addition, healthcare professionals need to recognize that patient education involves giving information and assisting with the acquisition of skills, as well as behaviour change on the part of the individual with asthma. This component of successful client education requires strong communication skills on the part of the provider (GINA, 2002).

Organization & Policy Recommendations

Recommendation • 7.0

Organizations should have available placebos and spacer devices for teaching, sample templates of action plans, educational materials, and resources for client and nurse education and where indicated, peak flow monitoring equipment. *(Level IV)*

Recommendation • 8.0

Organizations must promote a collaborative practice model within an interdisciplinary team to enhance asthma care. *(Level IV)*

Recommendation • 9.0

Organizations need to ensure that a critical mass of health professionals are educated and supported to implement the asthma best practice guidelines in order to ensure sustainability. *(Level V)*

Recommendation • 10.0

Agencies and funders need to allocate appropriate resources to ensure adequate staffing and a positive healthy work environment. *(Level V)*

Recommendation • 11.0

Nursing best practice guidelines can be successfully implemented only when there are adequate planning, resources, organizational and administrative support, and appropriate facilitation. Organizations may 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 *Toolkit* is recommended for guiding the implementation of *Adult Asthma Care Guidelines for Nurses – Promoting Control of Asthma*. *(Level IV)*

Refer to Appendix M for a description of the Toolkit.

Evaluation & Monitoring

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

Level of Indicator	Structure	Process	Outcome
	<ul style="list-style-type: none"> To evaluate the supports available in the organization that allow for nurses to promote control of asthma. 	<ul style="list-style-type: none"> To evaluate changes in practice that lead towards improved control of asthma. 	<ul style="list-style-type: none"> To evaluate the impact of implementing the recommendations.
Organization	<ul style="list-style-type: none"> Availability of client education resources (sample action plans, referral information) that are consistent with best practice guideline recommendations. Access to placebos (e.g., MDIs, Turbuhaler®, Diskus®), holding chambers (spacers) and peak flow meters for client education. Review of best practice guideline recommendations by organizational committee(s) responsible for policies or procedures. Availability of, and access to, asthma specialists. 	<ul style="list-style-type: none"> A standardized tool is used to assess asthma control. 	<ul style="list-style-type: none"> Policies and procedures related to assessing asthma control are consistent with the guidelines.
Nurse	<ul style="list-style-type: none"> Availability of educational opportunities related to promoting asthma control within the organization. Number of nurses attending educational sessions related to promoting asthma control. 	<ul style="list-style-type: none"> Level of asthma control assessed, including: <ul style="list-style-type: none"> inhaled short acting β_2 use; night time awakenings; daytime symptoms; interruption with daily activities. Nurses' self-assessed knowledge of: <ul style="list-style-type: none"> asthma control criteria; two main categories of asthma medication; correct inhaler/device technique; asthma action plans; and available educational materials and community resources. 	<ul style="list-style-type: none"> Evidence of documentation in client record consistent with guideline recommendations regarding: <ul style="list-style-type: none"> assessment of asthma control; assessment of inhaler/device technique; provision of asthma education; review of action plan; referral to asthma educator, asthma clinic or other community resource.

Level of Indicator	Structure	Process	Outcome
Client		<ul style="list-style-type: none"> Percent of clients reporting that their asthma control was assessed. Percent of clients reporting that the nurse reviewed the use and importance of an action plan. Percent of clients reporting that a nurse asked them to demonstrate the use of their inhaler/device. 	<ul style="list-style-type: none"> Percent of clients with acceptable asthma control. Percent of clients with action plans. Percent of clients judged to have satisfactory device technique. Percent of clients admitted to emergency department or hospital in one year with asthma related symptoms. Percent of clients with documented lung function measurements PEF and/or FEV₁ recorded.
Financial Costs	<ul style="list-style-type: none"> Provision of adequate financial and human resources for guideline implementation. 		

Examples of evaluation tools that were used to collect data on some of the indicators identified above during the pilot implementation/evaluation of this guideline are available at www.rnao.org/bestpractices.

Implementation Tips

This best practice guideline was pilot tested at Trillium Health Centre, a large two site acute care community-based hospital serving south Mississauga and Etobicoke, Ontario. The lessons learned and results of the pilot implementation may not be appropriate to generalize to other settings. However, there were many strategies used that the pilot site found helpful during implementation. Those who are interested in implementing this guideline may wish to consider these tips. A summary of these strategies follows:

- Communicating and raising awareness of asthma and the best practice guideline is critical. Consider having a project launch, use your agency's newsletter, or create a project news bulletin.
- Remember to set small incremental goals and to celebrate achieving your milestones.
- Consider "branding" your project with a logo or other form of identification – this logo can be used on all memos, posters and printed material to help identify and heighten project awareness around the organization.

- Transfer strategies that were helpful in nursing education included:
 - The development of clinical area specific education sessions. For example, content was tailored specifically for the nurses of the emergency department, inpatient units and outpatient clinics.
 - The development of a patient pathway (see Appendix N) and two different documentation tools for the emergency and in-patient departments allowed the nurses to target their assessment and teaching to the client's needs. This reduced duplication of nursing workload.
 - Pre-learning packages allowed nurses to familiarize themselves with some of the content prior to attending the educational sessions. This reduced the amount of content to be covered in the class, and allowed for more active involvement by participants in the session. The packages also acted as a source for a “refresher” after the sessions were complete.
 - A train-the-trainer approach proved to be helpful. After nurses received their education, they wore the project logo (a stoplight) on their name tag to identify themselves as someone that had completed their education and could act as a resource person to assist with patient teaching.
 - Once the initial education session was complete, the nurses facilitating the project implementation booked time on the nursing units to conduct short 15 minute review “in-services”. These refresher sessions used games and activities to help the nurses review their skills with medication devices, drug categories, and the use of a patient teaching booklet.
 - Patient teaching resources were placed in each of the clinical areas. These resources contained teaching tools such as medication placebos, patient education booklets and other materials that a nurse would need to teach clients and families.

In addition to the tips mentioned above, RNAO has published implementation 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 M. It is available for free download at www.rnao.org/bestpractices. Implementation resources developed by the pilot site are also available on the website to assist individuals and organizations implement this best practice guideline. These resources are specific to the pilot site, and have been made available as examples of local adaptation for guideline implementation.

Process For Update/Review of Guideline

The Registered Nurses Association of Ontario proposes to update the Best Practice Guidelines as follows:

1. Following dissemination, 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 Guideline project staff will regularly monitor for new systematic reviews, meta-analysis papers and randomized controlled trials (RCTs) in the field.
3. Based on the results of the monitor, project staff may recommend an earlier revision period. Appropriate consultation with a team comprised of original panel members and other specialists in the field will help inform the decision to review and revise the best practice guideline earlier than the three year milestone.
4. Three months prior to the three year review milestone, the project staff will commence planning of the review process as follows:
 - a) Invite specialists in the field to participate in the Review Team activities. The Review Team will be comprised of members from the original panel as well as other recommended specialists.
 - b) Compilation of feedback received, and questions encountered during the dissemination phase as well as other comments and experiences of implementation sites.
 - c) Compilation of new clinical practice guidelines in the field, systematic reviews, meta-analysis papers, technical reviews and randomized controlled trial research.
 - d) Develop a detailed work plan with target dates for 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

An initial database search for existing asthma guidelines was conducted in early 2001 by a company that specializes in searches of the literature for health related organizations, researchers and consultants. A subsequent search of the MEDLINE, Embase, and CINAHL databases for articles published from January 1, 1995 to February 28, 2001 was conducted using the following search terms and key words: “asthma”, “self care”, “self management”, “practice guideline(s)”, “clinical practice guideline(s)”, “standards”, “consensus statement(s)”, “consensus”, “evidence-based guidelines”, and “best practice guidelines”. In addition, a search of the Cochrane Library database for systematic reviews was conducted concurrently using the above search terms.

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STEP 2 – Internet Search

A metacrawler search engine (metacrawler.com) plus other available information provided by the project team was used to create a list of websites known for publishing or storing clinical practice guidelines. The following sites were searched in early 2001:

- Agency for Healthcare Research and Quality: www.ahrq.gov
- Alberta Clinical Practice Guidelines Program:
www.amda.ab.ca/general/clinical-practice-guidelines/index.html
- American Medical Association: www.ama-assn.org/
- Best Practice Network: www.best4health.org
- British Columbia Council on Clinical Practice Guidelines:
www.hlth.gov.bc.ca/msp/protoguide/index.html
- Canadian Centre for Health Evidence: www.cche.net
- Canadian Institute for Health Information (CIHI): www.cihi.ca/index.html
- Canadian Medical Association Guideline Infobase: www.cma.ca/eng-index.htm
- Canadian Task Force on Preventative Health Care: www.ctfphc.org/
- Cancer Care Ontario: www.cancercare.on.ca
- Centre for Disease Control: www.cdc.gov
- Centre for Evidence-Based Child Health: www.ich.bpmf.ac.uk/ebm/ebm.htm

- Centre for Evidence-Based Medicine: www.cebm.jr2.ox.ac.uk/
- Centre for Evidence-Based Mental Health: www.psychiatry.ox.ac.uk/cebmh/
- Centre for Evidence-Based Nursing: www.york.ac.uk/depts/hstd/centres/evidence/ev-intro.htm
- Centre for Health Services Research: www.nci.ac.uk/chsr/publicn/tools/
- Core Library for Evidence-Based Practice: www.shef.ac.uk/~scharr/ir/core.html
- Clinical Resource Efficiency Support Team (CREST): www.n-i.nhs.uk/crest/index.htm
- Evidence-based Nursing: www.bm.jpg.com/data/ebn.htm
- Health Canada: www.hc-sc.gc.ca
- Health Care Evaluation Unit: Health Evidence Application and Linkage Network (HEALNet): www.healnet.mcmaster.ca/nce
- Institute for Clinical Evaluative Sciences (ICES): www.ices.on.ca/
- Institute for Clinical System Improvement (ICSI): www.icsi.org
- Journal of Evidence-Based Medicine: www.bmjjpg.com/data/ebm.htm
- McMaster University Evidence-Based Medicine site: www.hiru.hirunet.mcmaster.ca/ebm
- McMaster Evidence-Based Practice Centre: www.hiru.mcmaster.ca/epc/
- Medical Journal of Australia: www.mja.com.au/public/guides/guides.html
- Medscape Multispecialty: Practice Guidelines: www.medscape.com/Home/Topics/multispecialty/directories/dir-MULT.PracticeGuide.html
- Medscape Women's Health: www.medscape.com/Home/Topics/WomensHealth/directories/dir-WH.PracticeGuide.html
- Monash University, Australia (Centre for Clinical Effectiveness) www.med.monash.edu.au/publichealth/cce/evidence/
- National Guideline Clearinghouse: www.guideline.gov/index.asp
- National Library of Medicine: www.text.nlm.nih.gov/ftsr/gateway
- Netting the Evidence: A SCHARR Introduction to Evidence-Based practice on the Internet: www.shef.ac.uk/uni/academic/
- New Zealand Guideline Group: www.nzgg.org.nz/library.cfm
- Primary Care Clinical Practice Guidelines: www.medicine.ucsf.edu/resources/guidelines/
- Royal College of General Practitioners: www.rcgp.org.uk/Sitelis3.asp
- Royal College of Nursing: www.rcn.org.uk
- Scottish Intercollegiate Guidelines Network: www.show.scot.nhs.uk/sign/home.htm
- TRIP Database: www.tripdatabase.com/publications.cfm
- Turning Research into Practice: www.gwent.nhs.gov.uk/trip/
- University of California: www.library.ucla.edu/libraries/biomed/cdd/clinprac.htm
- www.ish.ox.au/guidelines/index.html

One individual searched each of these sites. The presence or absence of guidelines was noted for each site searched – at times it was indicated that the website did not house a guideline but re-directed to another website or source for guideline retrieval. A full version of the document was retrieved for all guidelines.

STEP 3 – Hand Search/Panel Contributions

Panel members were asked to review personal archives to identify guidelines not previously identified. In a rare instance, a guideline was identified by panel members and not found through the database or Internet search. These guidelines were developed by local groups and had not been published to date. Results of this strategy revealed no additional clinical practice guidelines.

STEP 4 – Core Screening Criteria

This search method revealed multiple guidelines, several systematic reviews and numerous articles related to asthma. The final step in determining whether the clinical practice guideline would be critically appraised was to apply the following criteria:

- guideline was in English;
- guideline was dated 1995 or later;
- guideline was strictly about the topic area;
- guideline was evidence-based, i.e., contained references, description of evidence, sources of evidence; and
- guideline was available and accessible for retrieval.

Ten guidelines identified were deemed suitable for critical review using the Cluzeau et al. (1997) Appraisal Instrument for Clinical Practice Guidelines.

TITLE OF THE PRACTICE GUIDELINE RETRIEVED AND CRITICALLY APPRAISED

Alberta Medical Association (1999). *Guideline for the management of acute asthma in adults and children*. The Alberta Clinical Practice Guidelines Program. [Online]. Available: www.albertadoctors.org/resources/cpg/guidelines/acute_asthma.pdf.

Boulet, L. P., Becker, A., Bérubé, D., Beveridge, R., & Ernst, P. (1999). *Canadian asthma consensus report*. [Online]. Available: www.cmaj.ca/cgi/reprint/161/11_suppl_1/s1.pdf.

British Thoracic Society (1997). Revised guidelines on asthma management. *British Thoracic Society*, 12(Suppl. 1), 408-410.

Green, L., Baldwin, J., Grum, C., Erickson, S., Hurwitz, M., & Younger, J. (2000). *UMHA asthma guideline*. University of Michigan Health System [Online]. Available: www.guideline.gov.

Institute for Clinical Systems Improvement (2001). *Health care guideline: Diagnosis and management of asthma*. ICSI Health Care Guideline. [Online]. Available: www.ICSI.org/guidelist.htm#guidelines.

National Institutes of Health (1995). *Nurses: Partners in asthma care*. (No. 95-3308 ed.) NIH Publication.

National Institutes of Health (1997). *Guidelines for the diagnosis and management of asthma* (Rep. No. 2). NIH Publication. [Online]. Available: www.nhlbi.nih.gov/guidelines/asthma/asthgdln.htm.

Scottish Intercollegiate Guidelines Network (1996). *Hospital in-patient management of acute asthma attacks – SIGN 6*. [Online]. Available: www.show.scot.nhs.uk/sign/home.htm.

Scottish Intercollegiate Guidelines Network (1998). *Primary care management of asthma – SIGN 33*. [Online]. Available: www.show.scot.nhs.uk/sign/home.htm.

Scottish Intercollegiate Guidelines Network (1999). *Emergency management of acute asthma – SIGN 38*. [Online]. Available: www.show.scot.nhs.uk/sign/home.htm.

Three additional guidelines were identified and critically appraised during the guideline revision. These were appraised using the Appraisal of Guidelines for Research and Evaluation (AGREE) instrument (The AGREE Collaboration, 2001).

British Thoracic Society and the Scottish Intercollegiate Guidelines Network (2003). *British guideline on the management of asthma*. [Online]. Available: www.sign.ac.uk/pdf/sign63.pdf

Global Initiative for Asthma (2002). *Global strategy for asthma management and prevention*. [Online]. Available: www.ginasthma.com

New Zealand Guideline Group (2002). *Best practice evidence-based guideline: The diagnosis and treatment of adult asthma*. [Online]. Available: http://www.nzgg.org.nz/library/gl_complete/asthma/full_text_guideline.pdf



Appendix B: Glossary of Terms

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

Airway Remodeling: A collective term that encompasses the alterations in structural cells and tissues in the airways of some individuals with asthma, which may or may not be reversible.

Allergen: A protein or non-protein substance that is capable of inducing an allergic reaction or hypersensitivity. Common allergens can include: house dust mites, house dust, animals, food, mould, and pollen.

Antagonist: A substance that inhibits the normal physiological response of the body.

Asthma Episode: A worsening of asthma symptoms caused by bronchoconstriction, also referred to as an asthma attack, asthma exacerbation or asthma flare-up, in which the individual's asthma is out of control.

Atopy: Development of an immunoglobulin E (IgE) mediated response to common allergens.

β_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 medications that produce relaxation of the smooth muscles surrounding the bronchi, resulting in dilatation of the airways. See Relievers

Controllers: Controllers are medications that are taken regularly on a daily basis to minimize asthma symptoms from occurring and prevent exacerbations. They may also be known as preventers.

Corticosteroids: A group of synthetic hormones that suppress the various inflammatory processes involved with asthma and are currently the most effective maintenance therapy for most patients. See Controllers

Dry-Powder Inhaler (DPI): A breath activated device used to deliver medication in powder form to the lungs.

Forced Expiratory Volume in the first second in liters (FEV₁): The measure of the maximum volume of air a person can breathe out from the lungs in the first second of a forced expiratory manoeuvre. It is the most important measurement for monitoring obstructive lung disease and determines the severity of airway obstruction. The normal value is > 80% of the predicted value. See Spirometry

Hyperresponsiveness: The tendency of the smooth muscle of the airway to contract more intensely in response to a given stimulus/irritant than it does in a normal airway. This condition is present in virtually all symptomatic individuals with asthma. The most prominent manifestation of this smooth muscle contraction is airway narrowing.

Irritants: A class of triggers that are non-allergenic that can provoke asthma symptoms.

Leukotriene-Receptor Antagonists (LTRA): A non-steroidal anti-inflammatory medication that works by blocking the leukotriene receptors on cells involved in the inflammatory process.

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

Metered Dose Inhaler, Chlorofluorocarbon Propelled – MDI(CFC):
A metered-dose inhaler using a chlorofluorocarbon as the propellant for aerosolization of medication.

Metered Dose Inhaler, Hydrofluoroalkane Propelled – MDI(HFA):
A metered-dose inhaler using a hydrofluoroalkane as the propellant for aerosolization of medication.

Nebulizer: A machine that vapourizes medication, using either oxygen or compressed air. The resulting fine mist is inhaled from either a mask over the nose or a mouthpiece.

Peak Expiratory Flow in L/min (PEF): A measure of the maximum speed at which a person can forcefully expel air from the lungs following maximal inspiration. It provides a simple, quantitative and reproducible measure of the existence of airflow obstruction. The measurement is effort dependent.

Peak Flow Meter (PFM): A portable hand-held device used to measure peak expiratory flow rate.

Preventers: see Controllers

Relievers: Relievers are medications that are used to relieve asthma symptoms and to prevent asthma symptoms prior to exercise, exposure to cold air or other triggers. See Bronchodilators; β_2 agonists.

Spacers: A holding chamber device for aerosolized medication that attaches to metered-dose inhalers to make it easier to use, and to deliver more medication to the lungs. They are available in various sizes, with and without masks.

Spirometry: A test that measures forced expiratory volumes and flow rates. See FEV₁

Triggers: Factors that can provoke asthma symptoms. Every individual with asthma has a unique set of triggers for asthma symptoms. Triggers include both allergens and irritants.

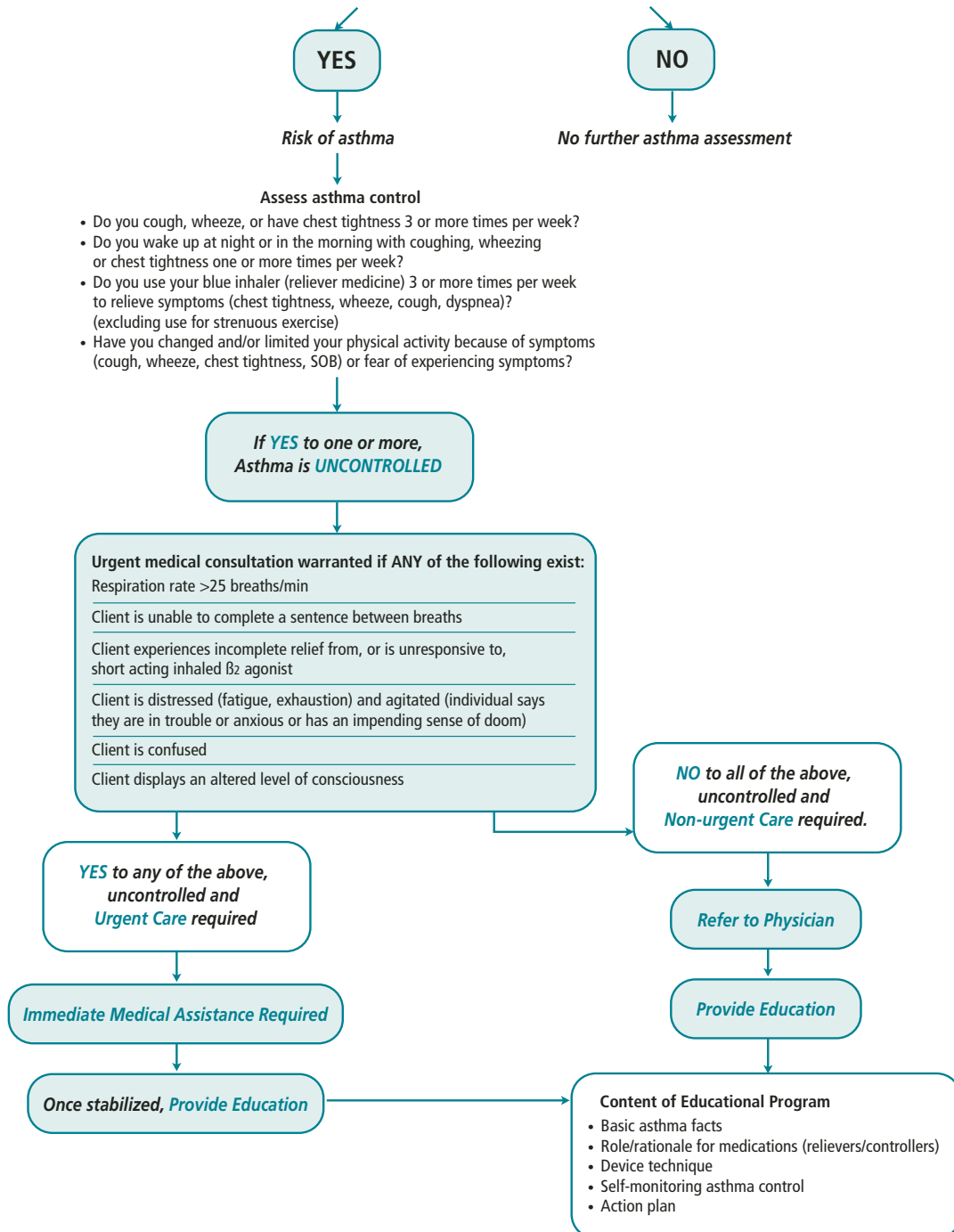
Appendix C: Assessing Asthma Control

Respiratory Screen to Identify those with Asthma

“Have you ever been told by a physician that you have asthma?” OR

“Have you ever used a puffer/inhaler for breathing problems?”

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Appendix D: Asthma Medications

The Canadian Asthma Consensus Report (1999) stresses the importance of using medications at the minimum dose and frequency required to maintain control of asthma symptoms (Level III). Once control has been established and maintained, physicians should consider reducing the daily dose of inhaled corticosteroids to the lowest dose necessary to control symptoms (Level IV). It is important however to recognize that medications are not to be used as a substitute for proper control of environmental factors, as persistent exposure to inflammatory triggers will require higher doses of medication to control asthma symptoms (Level III).

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People with asthma frequently search for complementary therapies to treat their asthma. Whether these treatments are used solely or as adjuvant, there is insufficient evidence demonstrating clinical benefit from complementary therapies (homeopathy, chiropractic, acupuncture, hypnosis and relaxation techniques, herbal medicine as well as Chinese, Japanese and Indian medicines) (Level I or II, depending on the therapy).

Medications used to treat asthma can generally be divided into two categories: relievers and controllers. They are available in various forms and are delivered through a variety of devices, however, the inhaled route is the preferred route as it minimizes systemic availability and therefore minimizes side effects (Level I).

a) Relievers

- Relievers are medications that are used primarily on an as-needed basis to relieve asthma symptoms. They may also be used to prevent asthma symptoms prior to exercise or other triggers.
- They are best represented by short-acting β_2 -agonists i.e., salbutamol and terbutaline. Recently, the long-acting β_2 -agonist Oxeze (formoterol) was approved for relief of acute bronchoconstriction.
- Relievers are to be used at the lowest dose and frequency required to relieve symptoms.
- Daily use of a short acting reliever for symptom control indicates that a controller (anti-inflammatory) medication is required (Level I). This does not include one dose per day to prevent exercise-induced bronchospasm.

- Ipratropium bromide is less effective than short-acting β_2 -agonists and is not recommended as first line therapy. It may be used as a reliever when short-acting β_2 -agonists are not well tolerated due to side effects (Level III).
- Use of an MDI with spacer is preferred over the use of a nebulizer for all clients of all ages at all levels of severity (Level I).
- For emergency situations, β_2 -agonists should be administered by inhalations and titrated using objective and clinical measures of airflow obstruction as dosage guides (Level I).
- In cases of acute asthma, the recommended dosage for β_2 -agonists is: 4 to 8 puffs every 15-20 minutes. However, it may be necessary to increase the dose to 1 puff every 30-60 seconds (Level IV).
- Once maximum relief is achieved, continued administration of bronchodilators by any route is not likely to provide further clinical benefit and may result in toxic effects (Level IV).

b) Controllers (preventers)

- Controllers are medications that are taken regularly on a daily basis to minimize asthma symptoms from occurring and to prevent exacerbations.
- Controllers are best represented by corticosteroids (inhaled and oral), a potent anti-inflammatory agent, and are considered the most effective medication in this category (Level I).

Corticosteroids

- Early initiation of treatment with inhaled corticosteroids, in the natural history of the disease, is associated with a better functional outcome (Level III).
- Initial daily dose in adults is commonly in the range of 400-1000 μ g of beclomethasone or equivalent. Higher doses of inhaled or the addition of oral or systemic corticosteroids may be required if the asthma is more severe (Level III).
- When asthma is out of control, it should be treated as soon as possible to prevent a severe exacerbation (Level III). This can be done with a 2 to 4-fold increase in inhaled corticosteroids (Level IV), or prednisone 0.5 to 1.0 mg/kg a day (Level I) as directed by a physician.

Other anti-inflammatories

- Other anti-inflammatory medications in the controller category that are non-steroidal include: leukotriene-receptor antagonists and anti-allergic agents (sodium cromoglycate and nedocromil).

Non anti-inflammatories

- Other medications are also included in the controller category. These include long-acting β_2 -agonists (salmeterol and formoterol), leukotriene-receptor antagonists theophylline, and ipratropium bromide. When additional therapy is required to control asthma symptoms, long-acting β_2 -agonists are the primary choice (Level I).
- Long-acting β_2 -agonists assist corticosteroids in achieving and maintaining asthma control (Level II). Because they mask the underlying airway inflammation, long-acting β_2 -agonists must be used in conjunction with inhaled corticosteroids (Level II).
- Leukotriene-receptor antagonists may be an alternative to increasing inhaled corticosteroids (Level III), but are not recommended as replacement therapy for inhaled corticosteroids.

Newer therapies such as long-acting β_2 -agonists and leukotriene-receptor antagonists have been shown to be effective second line therapy in the management of asthma (Level II). Leukotriene-receptor antagonists may be an alternative to increasing inhaled corticosteroids (Level III), but are not recommended as first line anti-inflammatory therapy in place of inhaled corticosteroids. They may, however, be used when a person with asthma cannot or will not use inhaled corticosteroids (Level IV).

Nurses need to be knowledgeable about the various medications within each category (Level IV). Knowledge of medications includes the following:

- trade and generic names;
- indications;
- doses;
- side effects;
- mode of administration; and
- pharmacokinetics.

Medications: Relievers & Controllers

The following table provides a comparison of asthma medications (relievers and controllers), their actions, side effects and pharmacokinetics.

MDI(CFC) – Metered dose inhaler, chlorofluorocarbon propelled

MDI(HFA) – Metered dose inhaler, hydrofluoroalkane propelled

PD – Powder Device

Relievers

Medications	Actions	Side Effects	Pharmacokinetics
Short acting β_2 agonists:			
salbutamol <ul style="list-style-type: none"> Airomir® MDI (HFA) 100µg Apo-Salvent® MDI(CFC) 100µg Novo-salmol® MDI(CFC) 100µg Ventolin® Diskus® PD 200µg Ventolin® MDI(HFA) 100µg Ventolin® Nebuamp® Wet Nebulization 1.25 or 2.5 mg terbutaline <ul style="list-style-type: none"> Bricanyl® Turbuhaler® PD 500µg fenoterol <ul style="list-style-type: none"> Berotec® MDI 100µg Berotec® vials Wet Nebulization 0.25 mg/ml, 0.625 mg/ml 	<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 	<p>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</p> <p>terbutaline Absorption: partially absorbed (PO), minimal (inhalation) Distribution: crosses placenta Metabolism: liver, gut wall Excretion: bile, feces, urine, breast milk Half-Life: unknown</p> <p>fenoterol Absorption: inhalation, minimal; incomplete PO Distribution: unknown Metabolism: liver, 90% Excretion: breast milk, kidney 12% Half-Life: 7 hours</p>
Anticholinergic:			
ipratropium bromide <ul style="list-style-type: none"> Atrovent® MDI 20µg, Atrovent® Wet Nebulization 125µg and 250 µg/ml 	<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"> dry mouth bad taste tremor 	<p>ipratropium bromide Absorption: minimal Distribution: does not cross blood-brain barrier Metabolism: liver, minimal Excretion: urine, feces Half-Life: 3-5 hrs</p>

Medications	Actions	Side Effects	Pharmacokinetics
Methylxanthine: <ul style="list-style-type: none"> aminophylline Phyllocontin® SRT theophylline <ul style="list-style-type: none"> Apo-Theo-LA SRT® Novo-Theophyl SRT® Quibron-I® Theochron SRT® Theolair SRT® 24-Hour: theophylline Uniphyll®	<ul style="list-style-type: none"> relaxes airway smooth muscle may have some anti-inflammatory effect clients may benefit even when serum levels are low 	<ul style="list-style-type: none"> Usually caused by a high drug serum concentration or the client's inability to tolerate the drug and include: <ul style="list-style-type: none"> upset stomach with heartburn nausea diarrhea loss of appetite headache nervousness insomnia tachycardia seizures 	theophylline 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 Several drug interactions include: <ul style="list-style-type: none"> antibiotics birth control pills Therapeutic Range: 29-55µmol/L

Controllers

Medications	Actions	Side Effects	Pharmacokinetics
Glucocorticosteroids (inhaled): <ul style="list-style-type: none"> beclomethasone <ul style="list-style-type: none"> Alti-beclomethasone MDI(CFC) 50µg QVAR® MDI(HEFA) 50µg, 100µg budesonide <ul style="list-style-type: none"> Pulmicort® Nebuamp® Wet Nebulization 0.125mg/ml, 0.25mg/ml and 0.5mg/ml Pulmicort® Turbuhaler® PD 100µg, 200µg and 400µg fluticasone <ul style="list-style-type: none"> Flovent® Diskus® PD 50µg, 100µg, 250µg and 500µg Flovent® MDI(CFC) 25µg, 50µg, 125µg and 250µg 	<ul style="list-style-type: none"> Prevents and suppresses activation and migration of inflammatory cells Reduces airway swelling, mucous production, and microvascular leakage Increases responsiveness of smooth muscle beta receptors 	<ul style="list-style-type: none"> Inhaled route: (up to equivalent of 1000 µg/day beclomethasone): <ul style="list-style-type: none"> sore throat hoarse voice thrush Rinsing, gargling and expectorating after inhalation can minimize these side effects. A spacer should be used with MDIs in order to assist in further reduction of possible side effects. 	beclomethasone Absorption: 20% Distribution: 10-25% in airways (no spacer) Metabolism: minimal Excretion: less than 10% in urine/feces Half-Life: 15 hrs budesonide Absorption: 39% (no spacer) Distribution: 10-25% in airways Metabolism: liver Excretion: 60% urine, smaller amounts in feces Half-Life: 2-3 hrs 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

Medications	Actions	Side Effects	Pharmacokinetics
Glucocorticosteroids (oral/intravenous):			
ORAL prednisone <ul style="list-style-type: none"> • Prednisone 5 mg and 50 mg tablets methylprednisolone <ul style="list-style-type: none"> • Medrol® 4 mg and 16 mg tablets 		Oral or IV route-short term (less than 2 weeks): <ul style="list-style-type: none"> • weight gain • increased appetite • menstrual irregularities • 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
INTRAVENOUS methylprednisolone SoluCortef® SoluMedrol®		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 	IV steroids: Absorption: rapid Distribution: widely distributed Metabolism: liver Excretion: urine Half-Life: 18 to 36 hrs, depending on the drug
Long-Acting β_2 agonists:			
formoterol <ul style="list-style-type: none"> • Foradil® PD 12µg • Oxeze® Turbuhaler® PD 6µg and 12µg salmeterol <ul style="list-style-type: none"> • Serevent® Diskus® PD 50µg • Serevent® MDI(CFC) 25µg 	<ul style="list-style-type: none"> • Promotes bronchodilation through stimulation of β_2-adrenergic receptors thereby relaxing airway smooth muscle salmeterol Onset of action: 10-20 minutes Duration: 12 hours formoterol Onset of action: 1-3 minutes Duration: 12 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 salmeterol Absorption: minimal systemic Distribution: local Metabolism: liver first pass Excretion: unknown Half-Life: 5.5 hrs

Medications		Actions	Side Effects	Pharmacokinetics
Anti-Leukotrienes:				
montelukast <ul style="list-style-type: none"> Singulair® 4 mg, 5mg and 10mg tablets zafirlukast <ul style="list-style-type: none"> Accolate® 20mg tablets 	<ul style="list-style-type: none"> Blocks the action of leukotrienes that are released by the membranes of inflammatory cells in the airways <i>Note:</i> Bioavailability is reduced with zafirlukast (Accolate) when given with foods 	montelukast <ul style="list-style-type: none"> headache abdominal pain stomach upset taken in the pm to help minimize side effects zafirlukast <ul style="list-style-type: none"> headache indigestion stomach upset 	montelukast <p>Absorption: rapidly</p> <p>Distribution: protein binding 99%</p> <p>Metabolism: liver</p> <p>Excretion: bile</p> <p>Half-Life: 2.7-5.5 hrs</p> zafirlukast <p>Absorption: rapid after oral administration</p> <p>Distribution: enters breast milk, 99% protein binding</p> <p>Metabolism: liver</p> <p>Excretion: feces, breast milk, 10% unchanged by kidneys</p> <p>Half-Life: 10 hrs</p>	
Non-steroidal (anti-allergic) Anti-inflammatory:				
nedocromil sodium <ul style="list-style-type: none"> Tilade® MDI(CFC) 2mg sodium cromoglycate <ul style="list-style-type: none"> Intal Ampules® Wet Nebulization 2ml:10mg/ml Intal® MDI(CFC) 1mg 	<ul style="list-style-type: none"> Inhibits inflammatory cell mediators release from mast cells 	nedocromil sodium <ul style="list-style-type: none"> headache stomach upset bad taste cough sodium cromoglycate <ul style="list-style-type: none"> throat irritation cough 	nedocromil sodium <p>Absorption: 90% inhaled dose swallowed; 2.5% of dose swallowed is absorbed; inhaled drug that reaches the lung is completely absorbed; bioavailability 6-9%</p> <p>Distribution: 28%-31% protein binding</p> <p>Metabolism: liver (metabolite)</p> <p>Excretion: unchanged in bile and urine</p> <p>Half-Life: 1.5-2.3 hrs</p> sodium cromoglycate <p>Absorption: poorly</p> <p>Distribution: unknown</p> <p>Metabolism: unknown</p> <p>Excretion: unchanged mostly in feces, bile and urine</p> <p>Half-Life: 80 min</p>	

Medications	Actions	Side Effects	Pharmacokinetics
Combination Drugs:			
Two bronchodilators: ipratropium bromide and salbutamol <ul style="list-style-type: none"> • Combivent® MDI 20µg ipratropium/120µg salbutamol • Combivent® Wet Nebulization 0.5mg ipratropium/3mg salbutamol per 2.5ml vial 	<ul style="list-style-type: none"> • the same as those listed for each medication separately 		
Long-acting bronchodilators and inhaled steroids fluticasone and salmeterol <ul style="list-style-type: none"> • Advair® Diskus® PD 100/50µg, 250/50µg, 500/50µg • Advair® MDI(HFA) 125/25µg, 250/25µg budesonide and formoterol <ul style="list-style-type: none"> • Symbicort® Turbuhaler® PD 100/6µg, 200/6µg 			

Appendix E: Device Technique

Medications: Inhalation Devices

Adapted with permission from The Lung Association: www.lung.ca/asthma/manage/devices.html

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

- Metered Dose Inhaler (puffer)
- Dry Powder Inhalers (Diskhaler®, Turbuhaler®, Diskus®)
- Nebulizer (used mostly with small children, therefore, not described in this Appendix)

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Accurate technique for using these devices is extremely important. Individuals with asthma should review the accurate use of these devices with a nurse, pharmacist, Certified Asthma Educator or other appropriately trained health professional.

Inhalation Delivery System

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 tell if 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: Proper Use

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. After 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 in the previous section.



Metered Dose Inhaler

Holding Chambers/Spacers

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



Holding Chamber/Spacer

Holding chambers are devices that hold the medication for a few seconds after it has been released from the inhaler. This is helpful for people who have trouble coordinating the spray of the inhaler and breathing. It also allows the client the advantage of taking more than one breath in for each puff when unable to hold their breath, particularly in an acute episode or in the case of young children. There are masks available for adults or children with some of the devices. The client must remember to wait a minute between each puff of the inhaler, even when using a holding chamber. This ensures the client is receiving the prescribed amount of medication. Holding chambers are indicated for all individuals who:

- Use a Metered Dose Inhaler
- Have trouble coordinating the hand-breath step

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 and reduces the chance of side effects.

Using a holding chamber may prevent the 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.

Holding Chamber: Proper Use

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. Put mouthpiece into mouth.
4. Depress inhaler (MDI) at beginning of slow deep inhalation. Hold breath as long as possible, up to 10 seconds before breathing out. If this is difficult, an alternative technique is to keep mouth tight on mouthpiece and breathe slowly 2-3 times after depressing inhaler (MDI).
5. Administer one puff at a time.
6. Slow down inhalation if you hear a “whistling” sound.
7. Follow instructions supplied with the inhaler (MDI) on amount of time to wait before repeating steps 3-6, as prescribed.
8. Remove the inhaler and replace the protective caps after use.

Care of a Holding Chamber

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

B. Dry Powder Inhalers (DPIs)

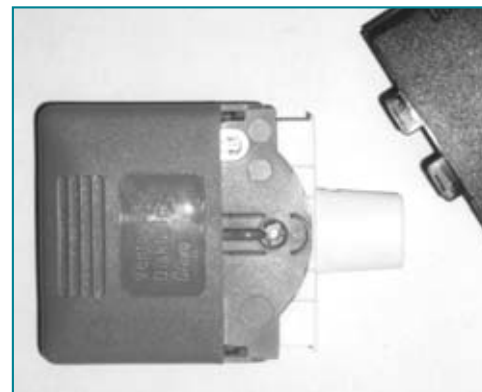
There are several dry powder inhalers available. Examples include the Diskhaler®, Turbuhaler® and the Diskus®.

General points of dry powder inhalers include:

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

Diskhaler®: Proper Use of a Diskhaler®

1. To load the Diskhaler®, remove the cover & cartridge unit.
2. Place a disk on the wheel with the numbers facing up & slide the unit back into the Diskhaler®.
3. Gently push the cartridge in & 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 & 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.

Turbuhaler®: 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.
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 up to 10 seconds.
7. If a second dose is prescribed, repeat the steps.



Turbuhaler®

When a red mark first appears in the little window, only twenty 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.

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.

Diskus®: 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, and then breathe out slowly.
4. *Close* – Place thumb on thumb grip, and slide the thumb grip towards body, as far as it will go.

Important: If more than one dose is prescribed, repeat steps 2-4. Rinse your 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.



Diskus®

Appendix F:

What is an Asthma Action Plan?

What is an Asthma Action Plan?

An asthma action plan is an individualized written plan developed for the purpose of client self-management of asthma (Gibson et al., 1999). The plan guides self-monitoring of asthma based on symptoms, reliever use and perhaps peak flow measurements, and details the management steps to take according to the level of asthma control. The action plan is tailored to the individual's preferences, treatment and usual pattern of exacerbations, and may incorporate triggers. Action plans should be developed in partnership with clients.

Often asthma action plans use a traffic light analogy having a green, a yellow, and a red zone. The green zone represents a time of acceptable and stable asthma control, and a “go ahead” with current therapy. The yellow zone represents a time of “caution” in that there are signs of worsening asthma and asthma control being lost. In response to this loss of control, suggestions may be made to adjust medications and/or seek medical assistance. The red zone represents a time of “danger” where asthma is identified as being out of control and severe enough to warrant urgent medical attention.

When should a written Asthma Action Plan be provided?

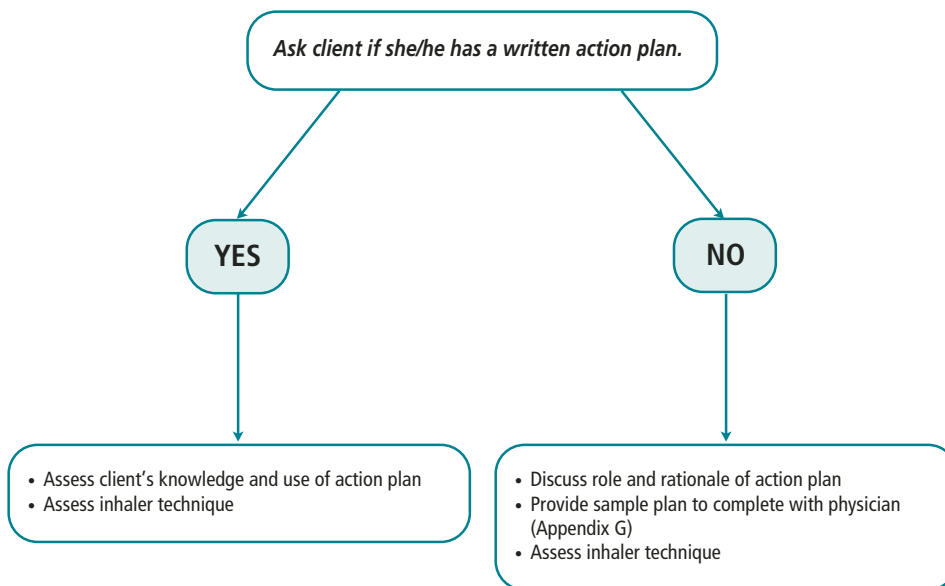
The Canadian Asthma Consensus Report (1999) recommends that every individual with asthma have a written action plan. An Ontario based survey of physicians observed that less than 25% of physicians provided written action plans. Those with more severe asthma were more likely than those with less severe asthma to receive an action plan (Cicutto et al., 1999).

An initial action plan should be provided when the diagnosis of asthma is established and/or at the time of discharge from the emergency department or hospital. The level of detail in the plan is dependent on the individual's understanding and preferences. Key components for teaching a patient how to use an action plan includes the signs and symptoms of worsening asthma, how to adjust medications and when to seek medical attention, either an office visit or urgent care. If the client has an action plan, careful questioning about the most recent episode will elicit understanding of the plan, assess skills needed for executing the plan, and identify the need for further education.

Key Points

- The core of asthma management is the individualized asthma action plan.
- An action plan outlines the criteria for determining control and informs the client of the necessary steps to maintain or regain asthma control.
- Overall, an action plan provides clients with a framework to understand their asthma management.

What Should the Nurse Do?



Appendix G: Sample Action Plans

Sample 1: Firestone Institute for Respiratory Care

Sample 2: Kaiser Permanente Center for Health Research

Sample 3: Kingston General Hospital Action Plan

Sample 4: University Health Network – The Asthma & Airway Centre, Toronto Western Hospital



Sample 1: Firestone Institute for Respiratory Care

Reproduced with permission of the Firestone Institute for Respiratory Care, St. Joseph's Healthcare, Hamilton, Ontario

RESPIROLOGIST

Name: _____

Phone: _____

ASTHMA TREATMENT CARD

It is important to tell every physician that you have asthma and the last date that you took prednisone.

CLINIC NURSE

Name: _____

Phone: _____

FIRESTONE INSTITUTE FOR

RESPIRATORY HEALTH

St. Joseph's Healthcare
Hamilton, Ontario, L8N 4A6

This card was brought up to date: _____
on _____ by _____
Please take this card to every doctor's appointment.

Patient Name: _____

REGULAR TREATMENT

INHALERS	Number of inhalations	Times per day
Advair ()		
QVAR ()		
Flovent ()		
Pulmicort ()		
Atrovent, Combivent ()		
Oxeze ()		
Serevent ()		
Other: _____		

WHAT TO DO IF YOU BECOME WORSE

If ANY of the following occur:

1. Increasing need for "rescue inhaler".
2. Increase in cough and/or sputum.
3. Increase in symptoms on waking.
4. Awakened at night by symptoms.
5. Peak flow rate after "rescue inhaler" is below _____

YOU MUST INCREASE TREATMENT TO:

Number of inhalations	Times per day
-----------------------	---------------

IF YOU CONTINUE TO GET WORSE AFTER

INCREASING TREATMENT

OR if your peak flow rate is below _____

TAKE PREDNISONE TABLETS ()

Day 1	_____	Day 6	_____
Day 2	_____	Day 7	_____
Day 3	_____	Day 8	_____
Day 4	_____	Day 9	_____
Day 5	_____	Day 10	_____

WHEN TO CONTACT YOUR DOCTOR

- If you continue to get worse OR
- If symptoms and/or peak flow rates are not back to your best in 5 days.

Please note: This action plan is designed as a three-fold pamphlet.

QVAR
Flovent
Pulmicort

Other: _____
until you are back to your best,
then return to your usual treatment.

If your phlegm is yellow or green, add: _____

RESCUE INHALER

Use as needed for wheeze, shortness of breath, chest tightness or cough:

Airomin, Bricanyl, Salbutamol, Ventolin, Oxeze

Other: _____

Sample 2: Kaiser Permanente Center for Health Research (Symptom Monitoring)

Reproduced with permission of the Kaiser Permanente Center for Health Research, Portland, Oregon.

LEVEL		STATUS	ACTION	
All Clear <ul style="list-style-type: none">■ No symptoms of an asthma episode■ Able to do usual activities■ Usual medications control asthma	1	DOING WELL	Medicine	TAKE: Dose _____ Max # Times/day _____
			_____	_____
			_____	_____
			_____	_____
Caution <ul style="list-style-type: none">■ Increased asthma symptoms (including waking at night due to asthma)■ Usual activities somewhat limited■ Increased need for asthma medications	2	INCREASE IN SYMPTOMS	Medicine	ADD: Dose _____ Max # Times/day _____
			_____	_____
			_____	_____
			Return to Level 1 when symptoms improve.	
Medical Alert <ul style="list-style-type: none">■ Increased symptoms longer than 24 hrs.■ Very short of breath■ Usual activities severely limited■ Asthma medications haven't reduced symptoms	3	NO IMPROVEMENT AFTER ____ HRS OR EVEN MORE SYMPTOMS	Medicine	ADD: Dose _____ _____
			_____	_____
			AND CALL YOUR PROVIDER	
			DANGER SIGNS	
			<ul style="list-style-type: none">■ Difficulty walking and talking due to shortness of breath■ Lips or fingernails are blue GO TO THE HOSPITAL NOW OR CALL 911 NOW	

Sample 2: Kaiser Permanente Center for Health Research (Peak Flow Monitoring)

Reproduced with permission of the Kaiser Permanente Center for Health Research, Portland, Oregon.

LEVEL	STATUS	ACTION
<p>Green Zone: All Clear</p> <p>My best peak flow: _____ Peak Flow _____ to _____ (100 to 80% of my best peak flow)</p> <ul style="list-style-type: none">■ No symptoms of an asthma episode■ Able to do usual activities■ Usual medications control asthma	<p>1 DOING WELL</p>	<p>TAKE:</p> <p>Medicine Dose Max # Times/day</p> <p>_____ _____ _____</p> <p>_____ _____ _____</p> <p>_____ _____ _____</p>
<p>Yellow Zone: Caution</p> <p>Peak Flow _____ to _____ (80 to 50% of my best peak flow)</p> <ul style="list-style-type: none">■ Increased asthma symptoms (including waking at night due to asthma)■ Usual activities somewhat limited■ Increased need for asthma medications	<p>2 INCREASE IN SYMPTOMS</p>	<p>ADD:</p> <p>Medicine Dose Max # Times/day</p> <p>_____ _____ _____</p> <p>Return to Level 1 when symptoms improve</p>
<p>Red Zone: Medical Alert</p> <p>Peak Flow _____ Less than _____ (50% of my best peak flow)</p> <ul style="list-style-type: none">■ Increased symptoms longer than 24 hrs■ Very short of breath■ Usual activities severely limited■ Asthma medications haven't reduced symptoms	<p>3 NO IMPROVEMENT AFTER ____HRS OR EVEN MORE SYMPTOMS</p>	<p>ADD:</p> <p>Medicine Dose _____</p> <p>_____ _____ _____</p> <p>AND CALL YOUR PROVIDER</p>
DANGER SIGNS	<ul style="list-style-type: none">■ Difficulty walking and talking due to shortness of breath■ Lips or fingernails are blue	<p>GO TO THE HOSPITAL NOW OR CALL 911 NOW</p>

Sample 3: Kingston General Hospital Asthma Action Plan

Reproduced with the permission of Kingston General Hospital, Kingston, Ontario.

“Asthma Action Plan”

For: _____

Predicted Peak Flow: _____ *Personal Best Peak Flow: _____

Developed By: _____ Date: _____

Approved By: _____ Date: _____

**Your action plan will be based on this number.*

(This Action Plan is not considered **active** until approved and signed by a physician)

Maintenance Medications:

Reliever: _____

Controller: _____

Other: _____

Your Asthma Is In Control If:

- You have no symptoms at rest, play, during the night or upon awakening.
- You need your reliever medication less than four times per week (not including prior to exercise or exposure to triggers).
- Your breathing tests and/or peak flow readings are normal for you.

Caution:

If at any time you:

- Are unsure
- Feel panicky
- Feel an overwhelming sense of doom

Contact your physician or go to emergency immediately. This action plan is a guideline only.

<p><u>GREEN ZONE: In Control</u></p> <ul style="list-style-type: none"> ■ You have no symptoms; ■ You are able to do normal activities and/or sports without being short of breath; ■ You are not waking up at night or early in the morning due to your asthma; ■ You are using your normal amount of reliever medication. <p>OR</p> <p>Peak Flow Above: _____ (≥80% personal best)</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Take your _____ (controller) _____ puff(s) _____ time(s) per day even if you are feeling well; <input type="checkbox"/> Take your other maintenance medication as prescribed; <input type="checkbox"/> Take your _____ (reliever) _____ puffs prior to exercise or exposure to triggers if necessary or for occasional symptoms (shortness of breath, wheeze, cough).
<p><u>YELLOW ZONE: Worsening Asthma</u></p> <ul style="list-style-type: none"> ■ You are short of breath on moderate activity, and/or ■ You need your _____ (reliever) more often than usual, and/or ■ You are waking at night or early in the morning with asthma symptoms, and/or ■ You are getting a cold. <p>OR</p> <p>Peak Flow between: _____ and _____ (60-80% personal best)</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Take your _____ (controller) _____ puffs _____ times per day for 10-14 days and then return to the "Green Zone"; <input type="checkbox"/> Take your _____ (reliever) _____ puffs every 4 hours as necessary to relieve symptoms; <input type="checkbox"/> If no improvement in your symptoms and/or peak flows in 2 days or your reliever only lasts for 2-3 hours go to the "Red Zone".
<p><u>RED ZONE: Severe Asthma</u></p> <ul style="list-style-type: none"> ■ Your reliever is lasting 2 hours or less and/or ■ You do not feel better or your PEFR is under _____ (70% personal best) 20 to 60 minutes after taking your reliever and/or ■ You are short of breath, wheezing and/or have trouble breathing at rest or with normal activities. <p>OR</p> <p>Peak Flow between: _____ and _____ (50-60% personal best)</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Take your _____ (reliever) _____ puffs every 20 minutes up to a total of 3 times and then every 4 hours; <input type="checkbox"/> Take prednisone _____ mg now and daily for the next _____ days; <input type="checkbox"/> Call your doctor and see him/her within 24 hours or right away if getting worse. <input type="checkbox"/> Dr. _____ Phone number: _____
<p><u>EXTRA RED ZONE: Medical Emergency</u></p> <ul style="list-style-type: none"> ■ Your reliever is lasting 2 hours or less and/or ■ You are unable to talk in sentences and/or ■ You have blueness around your lips and nails and/or ■ You are frightened by your asthma and/or ■ You are having a sudden severe attack. <p>OR</p> <p>Peak Flow below: _____ (<50% personal best)</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Go directly to Emergency or <input type="checkbox"/> Dial 911; <input type="checkbox"/> Take your reliever medication as necessary on the way to the hospital.

Sample 4: Toronto Western Hospital of the University Health Network

Reproduced with the permission of the Asthma and Airway Centre
University Health Network – Toronto Western Hospital, Toronto, Ontario

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<p style="text-align: center;">Management Plan based on Peak Flows</p> <p>*It is important to know what to do in case you have a severe asthma attack / episode.</p> <p><i>Using your peak flows as a guide after establishing your personal best:</i></p> <p>Predicted peak flow L/Min</p> <p>Best peak flow L/Min 80 – 100%</p> <p>Peak flow requiring Additional Medications L/Min 60 – 80%</p> <p>Peak flow requiring urgent Medical attention L/Min Less than 60%</p> <p><small>N.B. Your Peak flows should be reviewed by your health care provider intermittently.</small></p> <p style="text-align: center;"><small>Know what to do</small></p>	<p>Signs of Poor Asthma Control</p> <ul style="list-style-type: none"> ▪ Having cough, wheeze, chest tightness or shortness of breath during the day or night ▪ Need your quick relief inhaler more than 4 times a week (one dose before exercise) ▪ Unable to tolerate usual activities ▪ Lower peak flows than usual <p>If you are having any of the above symptoms - follow the instructions indicated in your Action Plan on the other side of this card or see your doctor.</p> <p style="text-align: center;">EMERGENCY ACTION PLAN WHEN...</p> <ul style="list-style-type: none"> ▪ You are not getting relief from your reliever (blue) inhaler ▪ You have trouble to breathe and talk ▪ Your nails and lips are blue/gray ▪ You are feeling very tired, or having fear of dying - DO NOT DELAY GET HELP IMMEDIATELY CALL 911 <p>You can take 2 – 3 puffs of your quick relief inhaler every 10 – 15 minutes on your way to the Hospital, preferably by ambulance.</p> <p style="text-align: center;"><small>Developed by Kay Khan RN, CAE - Clinical Nurse Educator</small></p>	<div style="text-align: right;"> <p>Toronto Western Hospital University Health Network</p> </div> <p style="text-align: center;">Asthma & Airway Centre Management and Action Plan</p> <p>Name: _____</p> <p>Address: _____</p> <p>Telephone #: _____</p> <p>Family Doctor: _____ Phone #: _____</p> <p>Asthma Specialist: _____ Phone #: _____</p> <p>Ambulance Phone # 911</p> <p style="text-align: center;">Emergency Department Toronto Western Hospital 416 – 603 – 5757</p> <p style="text-align: center;"><small>www.Asthmacentre.com</small></p>																																																	
<p>Regular Maintenance Medication</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">Regular Medication</th> <th rowspan="2">Drug Action</th> <th rowspan="2">Dose</th> <th colspan="4">Times</th> <th rowspan="2">Instructions</th> <th rowspan="2">Common Side effects</th> </tr> <tr> <th></th> <th></th> <th></th> <th></th> </tr> </thead> <tbody> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> </tbody> </table>			Regular Medication	Drug Action	Dose	Times				Instructions	Common Side effects																																								
Regular Medication	Drug Action	Dose				Times						Instructions	Common Side effects																																						
<p>Action Plan if your asthma worsens:</p> <p>Step 1. Use your quick reliever puffs every hours if necessary.</p> <p>Step 2. Start / Increase puffs times a day until well or (Peak Flows back to usual best)</p> <p style="padding-left: 20px;">then decrease to your usual maintenance dose.</p> <p>Step 3. If not getting better or (Peak Flows less than) start Prednisone mg for days. See your Doctor.....</p> <p>Step 4. For severe episodes seek Emergency help – see Emergency Action Plan on other side of this card.</p>																																																			
<p style="text-align: center;">Keep Your Asthma Under Control</p> <table style="width: 100%;"> <tr> <td style="width: 33%; vertical-align: top;"> <ul style="list-style-type: none"> ▪ Practice preventive measures for asthma triggers ▪ Take medications as prescribed ▪ Know the actions and side effects of your medications </td> <td style="width: 33%; vertical-align: top;"> <ul style="list-style-type: none"> ▪ Always keep your quick relief inhaler with you ▪ Don't ignore early warning signs of worsening asthma </td> <td style="width: 33%; vertical-align: top;"> <ul style="list-style-type: none"> ▪ Keep follow-up appointments ▪ Carry this card with you at all times ▪ Consider your asthma when making travel plans </td> </tr> </table>			<ul style="list-style-type: none"> ▪ Practice preventive measures for asthma triggers ▪ Take medications as prescribed ▪ Know the actions and side effects of your medications 	<ul style="list-style-type: none"> ▪ Always keep your quick relief inhaler with you ▪ Don't ignore early warning signs of worsening asthma 	<ul style="list-style-type: none"> ▪ Keep follow-up appointments ▪ Carry this card with you at all times ▪ Consider your asthma when making travel plans 																																														
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Appendix H: Peak Flow Monitoring Tips

1. Monitoring Peak Expiratory Flow (PEF) may be useful in some clients, particularly those who are poor perceivers of airflow obstruction.
2. Caution should be exercised in interpreting PEF results, as they are extremely effort dependent, and should be used in conjunction with other clinical findings.
3. The client's PEF technique should be observed until the practitioner is satisfied that the technique produces accurate readings. (See Appendix I)
4. Home PEF should be linked to the assessment of symptoms in the action plan.
5. Clients who are using a PEF meter should be instructed on how to establish their personal best PEF and use it as the basis of their action plan.
6. PEF devices must be checked regularly for accuracy and reproducibility of results.
7. Baseline morning and evening monitoring should be carried out over a number of weeks and continued regularly, with the frequency adjusted to the severity of the disease.
8. Clients should be alerted to the significance of increased diurnal variation (evening to morning changes) in PEF, greater than 15-20%.
9. The accuracy of a client's peak flow meter should be determined at least once a year or any time there is a question about its accuracy. Values from spirometry or another portable meter should be compared.

Samples of Peak Flow Meters



Mini Wright®
Peak Flow Meter



Vitalograph®
asmaPLAN+



Truzone®
Peak Flow Meter

Appendix I:

How to use a Peak Flow Meter (PFM)

Follow these five steps for using a Peak Flow Meter:

1. Move the indicator to the bottom of the numbered scale.
2. Stand up, or sit upright.
3. Take a deep breath in, and fill lungs completely.
4. Place the mouthpiece in mouth and close lips around it.
5. Blow out as hard and fast as possible in a single blow.

- Write down the value. If coughing occurred, the value is inaccurate. Do not record. Repeat the test.
- Repeat steps 1 through 5 two more times.
- Take the highest result of the three, and record.

Finding the Personal Best Peak Flow Number

The client's personal best peak flow number is the highest peak flow number achieved over a 2 to 3 week period when asthma is under good control.

Each client's asthma is different, and the "best" peak flow value may be higher or lower than another person's of the same height, weight, and sex. The action plan needs to be based on the client's personal best peak flow value.

To identify the client's personal best peak flow number, have the client take peak flow readings:

- At least twice a day for 2 to 3 weeks.
- Upon awakening and before bed.
- Prior to and 15 minutes after taking a short-acting inhaled bronchodilator (reliever).

Appendix J:

Tips for Improving Adherence

- Build a partnership with the client by establishing mutual goals for asthma care.
- Assess individual barriers to adherence, including misperceptions regarding asthma and its management.
- Assess any cultural or ethnic beliefs or practices that may influence self-management activities, i.e., “In your community, what does asthma mean?”
- Display open communication by showing attentiveness (i.e., eye contact), providing encouragement with non-verbal communication (i.e., smiling, nodding), using verbal praise for effective management strategies (i.e., “That is great” or “You did the right thing”), and using interactive conversation style (i.e., ask open-ended questions).
- Language should be clear, unambiguous, and presented using non-technical language. Make sure that you seek client feedback and elicit their understanding.
- Tailor the level and amount of education to suit the client.
- Provide client education using multiple teaching strategies (discussion, written materials, video, interactive websites).

Ensure that clients with asthma have adequate information to facilitate appropriate self-management.

- Promote the use of a written individualized asthma action plan.
- Simplify treatment and the action plan as much as possible.
- Encourage the client to use activities of daily living (i.e., shaving, brushing teeth, meal time) as reminders to take medication.
- Review and reinforce good inhaler technique.
- Education to improve medication adherence should address the following:
 - The severity of the client’s asthma.
 - The pros and cons to treatment options.
 - The consequences of not following the treatment plan.
 - Erroneous beliefs that asthma medications are not needed.
 - Issues related to asthma medications:
 - Side effects of medications.
 - Clarify misperceptions, particularly related to use of steroids.

Appendix K: Resources

Resources for Assisting with Client Asthma Education:

Practice settings may access resources for educational materials and tools to provide asthma education through several sources:

- The Asthma Society of Canada 1-800-787-3880
- The Lung Association 1-800-972-2636
- Asthma and Allergy Information Association
- Local community asthma clinics – see Appendix L
- Pharmaceutical Companies:
 - Contact your local pharmaceutical representative.
 - Teaching Tools: Inhaler placebos, spacers, peak flow meters, posters.

Recognized Healthcare Internet websites:

- The Asthma Centre – University Health Network – www.uhn.ca/programs/asthma/
- Asthma in Canada – www.asthmaincanada.com
- Asthma Society of Canada – www.asthma.ca/adults
- Canadian Asthma Consensus Guidelines Secretariat – www.asthmaguidelines.com
- Canadian Network for Asthma Care – www.cnac.net
- Family Physician Airways Group of Canada – www.asthmaactionplan.com
- The Lung Association – www.lung.ca
- National Institutes of Health (US Department of Health and Human Services) – www.nih.gov

Opportunities for Continuing Professional Development in Asthma Care:

Canadian Network for Asthma Care (CNAC) Approved Asthma Educator Programs:

The Canadian Network for Asthma Care (CNAC) has approved several asthma educator programs. Please refer to their website (www.cnac.net) for a full listing of approved programs. The Michener Institute for Applied Health Sciences is the primary program in Ontario. Subject to other criteria for certification, graduates of these approved programs will be eligible to sit for the Certified Asthma Educator (C.A.E.) Examination.

**Asthma Educator Program of The Michener Institute for Applied Health Sciences –
Toronto, Ontario**

For registration information:

Division of Continuing Education

The Michener Institute for Applied Health Sciences

222 St. Patrick Street, Toronto, ON M5T 1V4

Tel: 416-596-3101 ext 3162

1-800-387-9066 ext 3308

Email: ce@michener.ca

www.michener.ca

The Canadian Network for Asthma Care lists several approved programs provided in other provinces and internationally by distance on their website at www.cnac.net/english/certprograms.html.

The Lung Association

The Lung Association's (Ontario) professional section, the Ontario Respiratory Care Society, has an asthma educator's interest group. This group offers an annual seminar, several evening sessions, a newsletter and other educational opportunities throughout the year. Please refer to the Ontario Respiratory Care Society's home page at www.on.lung.ca/orcs/mission.html or contact them at orcs@on.lung.ca.

Appendix L: Asthma Clinics in Ontario

The Canadian Network for Asthma Care (CNAC) is an association of associations. Its mission statement is “through its member organizations, CNAC is dedicated to the promotion of asthma care and education in Canada with the ultimate goal of reducing illness and death caused by this common disease”.

It coordinates several activities of its member organizations in the asthma education area. The CNAC does not offer medical advice, nor does it refer members of the public to medical practitioners. However, the CNAC maintains a self-reporting listing of organizations, agencies, and hospitals providing asthma education programs to individuals affected with asthma for all provinces in Canada. This listing is by province, including Ontario.

Current information regarding these programs, location, referral process and service focus is posted on the CNAC website at www.cnac.net/english/clinics.html.



Appendix M: Description of the Toolkit

Best practice guidelines can only be successfully implemented if there are: adequate planning, resources, organizational and administrative support as well as appropriate facilitation. In this light, RNAO, through a panel of nurses, researchers and administrators has developed a *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 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 an evaluation.
6. Identifying and securing required resources for implementation and evaluation.

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

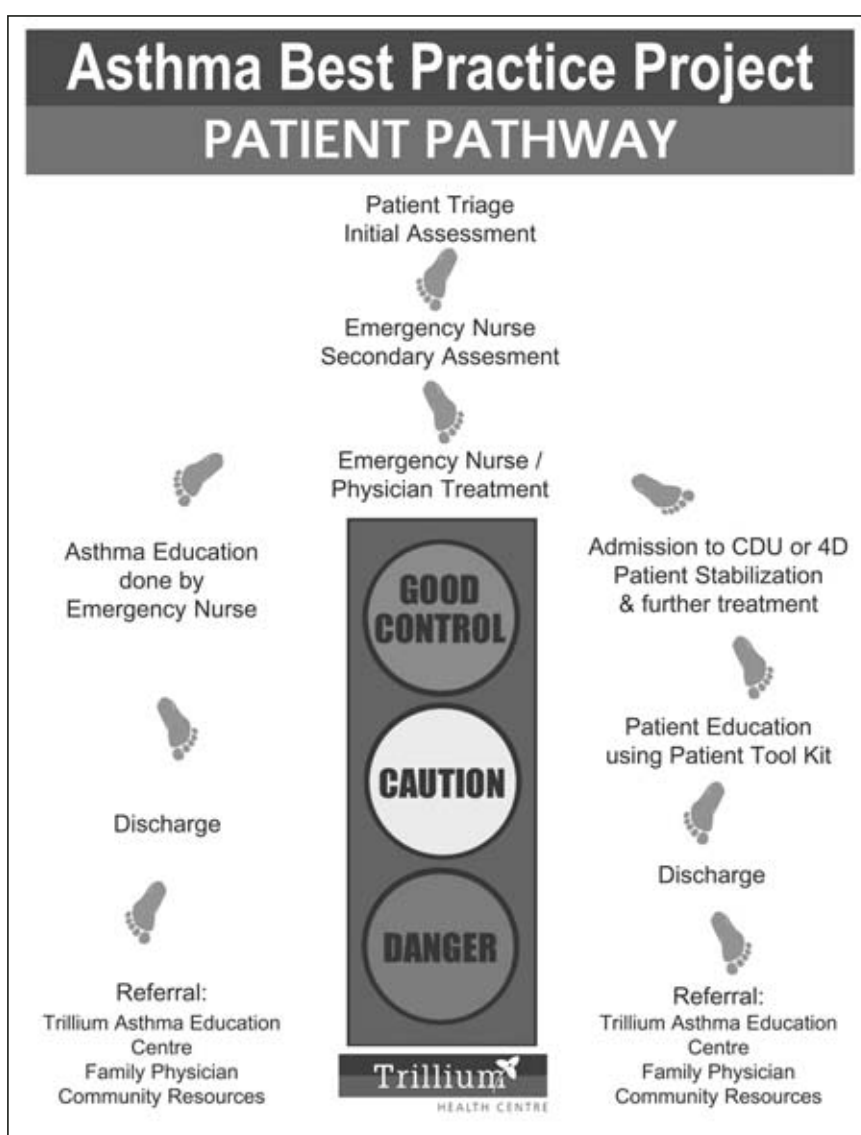
The *Toolkit* is available through the Registered Nurses Association of Ontario. The document is available in a bound format for a nominal fee, and is also available free of charge from the RNAO website. For more information, an order form or to download the *Toolkit*, please visit the RNAO website at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

Appendix N: Implementation Resources

The following “patient pathway” was developed by Trillium Health Care, the acute care community-based hospital that pilot implemented this best practice guideline. This pathway is included here as an example of how one practice setting adapted the recommendations in this guideline to meet their local needs. This tool

allowed the nurses to target their assessment and teaching to meet the patient’s needs, and to reduce duplication in care.

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Reproduced with permission of Trillium Health Centre, Mississauga, Ontario.

Notes:

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

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February 2007

Nursing Best Practice Guideline

Shaping the future of Nursing



Adult Asthma Care Guidelines for Nurses: Promoting Control of Asthma Supplement

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Supplement Integration

This supplement to the nursing best practice guideline *Adult Asthma Care Guidelines for Nurses: Promoting Control of Asthma* is the result of a three year scheduled revision of the guideline. Additional material has been provided in an attempt to provide the reader with current evidence to support practice. 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 to provide the best possible care.

A review of the literature suggests that adult asthma continues to be poorly controlled and remains a primary goal for asthma care. A Canadian study, The Reality of Asthma Control (TRAC), revealed that 97% of individuals thought their asthma was well controlled; however, only 47% had

controlled disease (Fitzgerald et al., 2006). Action plans remain an essential component of asthma care but only 11% of individuals have an action plan. Since the publication of our original asthma guideline in 2004, there have not been dramatic changes in asthma care. A review of the most recent literature and asthma practice guidelines published in Canada, the United States, the United Kingdom and from the World Health Organization over the last 3-4 years does not suggest dramatic changes to our approach to asthma care, but rather suggests some refinements and stronger evidence for our approach.

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 3 years. The revision panel members (experts from a variety of practice settings) are given a mandate to review the guideline focusing on the recommendations and the original scope of the guideline.



RNAO

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

NURSING BEST PRACTICE GUIDELINES PROGRAM

Members of the panel critically appraised four international guidelines, published since 2002, using the *Appraisal of Guidelines for Research and Evaluation Instrument* (AGREE, 2001). The guidelines were:

National Institutes of Health (2003). *National Asthma Education and Prevention Program: Expert Panel Report: Guidelines for the Diagnosis and Management of Asthma, Update on Selected Topics 2002* (Rep. No. 02-5074).

British Thoracic Society & Scottish Intercollegiate Guidelines Network (2003). *British Guideline on the Management of Asthma: A National Clinical Guideline*. (2005 Update).

Global Initiative for Asthma (2002). *Global Strategy for Asthma Management and Prevention (updated 2005)*. (NIH Publication No 02-3659).

Global Initiative for Asthma (2006). *Global Strategy for Asthma Management and Prevention*. [Online]. Available: www.ginasthma.org.

The AGREE review resulted in all four of these guidelines being used to inform the revision process of the RAO guideline.

Background Context

The following content is to be added to the discussion of “What is Asthma” on page 25 of the guideline: “Regardless of the client’s asthma severity, any loss of asthma control can potentially be life-threatening. It is important to emphasize asthma control when a nurse is conducting an assessment rather than

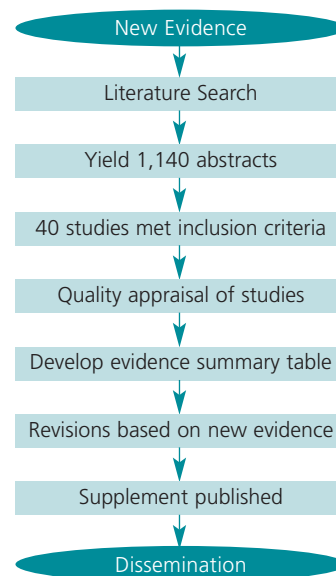
asthma severity. Labeling clients by severity can be misleading. A client that has “mild” asthma or “severe” asthma can have potentially life threatening asthma. The best way to prevent an asthma death is to keep asthma under good control regardless of severity.”

The definition of asthma control is evolving both nationally and internationally. The revision of this guideline is consistent with the current parameters for asthma control endorsed by the Canadian Asthma Consensus Report (Boulet et al., 1999). However, the revision panel acknowledges that the definition used in this supplement will require re-assessment once the most recent update of the Canadian Asthma Consensus Report is released, to ensure there is consistent messaging related to this important aspect of asthma management. The most recent edition of the GINA guidelines (GINA, 2006) suggest that the cut off for some of the criteria for assessing asthma control may be changing.

The following reference is to be added to the discussion of “What Causes Asthma” on pg. 26 of the guideline under the section related to “Irritants – Tobacco smoke”: RAO guideline *Integrating Smoking Cessation into Daily Nursing Practice* (2003).

The wording of the subheading on page 27 is to be changed to read, “c) Other factors that can trigger or make asthma more difficult to control”. This is to emphasize the importance of achieving asthma control, regardless of asthma severity.

Review/Revision Process Flow Chart





Summary of Evidence









The following content reflects the evidence reviewed that either supports the original guideline recommendations, or provides evidence for revision. Through the review process, no recommendations were deleted. However, a number of recommendations were re-worded for clarity or to reflect new knowledge and three new recommendations have been added.

✓	unchanged
✎	changed
+	additional information
NEW	new recommendation

Practice Recommendations	
Recommendation 1 <i>All individuals identified as having asthma, or suspected of having asthma, will have their level of asthma control assessed by the nurse.</i>	✓
Additional Literature Supports Bousquet et al., 2005	+
Recommendation 1.1 <i>Every client should be screened to identify those most likely to be affected by asthma. As part of the basic respiratory assessment, nurses should ask every client two questions:</i> <ul style="list-style-type: none"> ■ Have you ever been told by a physician or a health care provider that you have asthma? ■ Have you ever used a puffer/inhaler or asthma medication for breathing problems? <i>(Level IV)</i>	✓
Recommendation 1.2 <i>For individuals identified as having asthma or suspected of having asthma, the level of asthma control should be assessed by the nurse. Nurses should be knowledgeable about the acceptable parameters of asthma control which are:</i> <ul style="list-style-type: none"> ■ use of inhaled short-acting β_2 agonist <4 times/week (unless for exercise); ■ having daytime asthma symptoms <4 times/week; ■ experience night-time asthma symptoms <1 time/week; ■ normal physical activity levels; ■ no absence from work or school; and ■ infrequent and mild exacerbations. <i>(Level IV)</i>	✓
The table on page 31 of the guideline should be updated to include a reference to the updated Canadian Asthma Consensus Report (Becker et al., 2003). Additional Literature Supports Becker et al., 2003	+
Recommendation 1.3 <i>For individuals identified as potentially having uncontrolled asthma, the level of acuity needs to be assessed by the nurse and an appropriate medical referral provided, i.e., urgent care or follow-up appointment.</i> <i>(Level IV)</i>	✓
Recommendation 2.0 <i>Asthma education, provided by the nurse, must be an essential component of care.</i>	✓
Additional Literature Supports Mager et al., 2005	+

<p>Recommendation 2.1</p> <p><i>The client's asthma knowledge and skills should be assessed and where gaps are identified, asthma education should be provided.</i></p> <p>(Level I)</p>	✓
<p>Additional Literature Supports</p> <p>Paasche-Orlow et al., 2005</p>	+
<p>Recommendation 2.2</p> <p><i>Education should include as a minimum, the following:</i></p> <ul style="list-style-type: none"> ■ basic facts about asthma; ■ roles/rationale for medications; ■ device technique(s); ■ self-monitoring; ■ action plans; and ■ smoking cessation (if applicable). <p>(Level IV)</p>	
<p>When educating on the various aspects of asthma and asthma control, it is important for the nurse to determine if the person smokes, and if so provide counseling and education regarding smoking cessation. Clients with asthma that smoke should be informed that they are at a higher risk for having poorly controlled asthma and that it is likely that they will require more medication to control asthma than if they did not smoke. Education related to smoking cessation has been added to the recommendation to reflect this area of focus. Recent strong evidence suggests that smoking impairs the therapeutic benefits of corticosteroids (Chaudhuri et al., 2003; Chalmers et al., 2002; Tomlinson et al., 2005).</p> <p>New subheading on page 33 to read, "Smoking cessation (if applicable)" to be added, with reference to the RNAO guideline <i>Integrating Smoking Cessation into Daily Nursing Practice</i>.</p> <p>Additional Literature Supports</p> <p>Chalmers et al., 2002; Chaudhuri et al., 2003; Eisner et al., 2005; Marabini et al., 2002; McHugh et al., 2003; RNAO, 2003; Tomlinson et al., 2005</p>	+
<p>Recommendation 3.0</p> <p><i>Every client with asthma should have an individualized written asthma action plan for guided self-management.</i></p> <p>(Level I)</p>	NEW
<p>This new recommendation has been created from the original Recommendation 3.1 which has been divided into two separate recommendations. The purpose of this change is to emphasize the importance of all clients with asthma having a written asthma action plan.</p> <p>Additional Literature Supports</p> <p>BTS/SIGN, 2004; GINA, 2006</p>	+
<p>Recommendation 3.1</p> <p><i>An action plan should be developed in partnership with the healthcare professional and be based on the evaluation of symptoms with or without peak flow measurement.</i></p> <p>(Level I)</p>	
<p>The wording of this recommendation has been modified to emphasize the fact that the client and healthcare professional should work in partnership to develop the action plan. The change in the wording is for clarification only, and there has been no change in the intent of the recommendation.</p> <p>Additional Literature Supports</p> <p>GINA, 2006; National Institutes of Health, 2003; Osman et al., 2002; Powell & Gibson, 2006; Smith et al., 2005</p>	+

<p>Recommendation 3.2</p> <p><i>For every client with asthma, the nurse needs to assess his/her understanding of the asthma action plan. If a client does not have an action plan, the nurse needs to provide a sample action plan, explain its purpose and use, and coach the client to complete the plan with his/her asthma care provider.</i></p> <p>(Level V)</p>	✓
<p>Recommendation 3.3</p> <p><i>Where deemed appropriate, the nurse should assess, assist and educate clients in measuring peak expiratory flow rates. A standardized format should be used for teaching clients how to use peak flow measurements.</i></p> <p>(Level IV)</p>	✓
<p>Recommendation 4.0</p> <p><i>Nurses will understand and discuss asthma medications with their clients.</i></p>	
<p>The wording of this recommendation has been modified to emphasize the need for action related to client education and medication use. The change in the wording is for clarification only, and there has been no change in the intent of the recommendation.</p>	+
<p>Recommendation 4.1</p> <p><i>Nurses will understand and discuss the two main categories of asthma medications (controllers and relievers) with their clients.</i></p> <p>(Level IV)</p>	
<p>The wording of this recommendation has been modified to emphasize the need for nursing intervention related to client education and medication use. As a component of asthma knowledge related to medications, there is an emphasis on the need for the nurse to have knowledge of both categories of asthma medications and proper device technique in order to provide client education.</p> <p>Additional Literature Supports</p> <p>Finn et al., 2003</p>	+
<p>Recommendation 4.2</p> <p><i>Clients with asthma will have their inhaler/device technique assessed by the nurse to ensure accurate use. Clients with sub-optimal technique will be coached in proper inhaler/device use.</i></p> <p>(Level I)</p>	
<p>The wording of this recommendation has been modified to emphasize that clients <i>will</i> have their inhaler/device technique assessed. The change in the wording is for clarification only, and there has been no change in the intent of the recommendation.</p>	+
<p>Recommendation 5.0</p> <p><i>The nurse will facilitate referrals for clients with asthma as appropriate.</i></p>	
<p>The wording of this recommendation has been modified to emphasize that it is <i>clients with asthma</i> who should be referred to an asthma educator and/or additional asthma resources in their community. The change in the wording is for clarification only, and there has been no change in the intent of the recommendation.</p>	+

<p>Recommendation 5.1</p> <p><i>Clients with poorly controlled asthma will be advised to see a physician.</i></p> <p>(Level II)</p>	
<p>The wording of this recommendation has been modified to emphasize that clients with poorly controlled asthma <i>will be advised</i> to see a physician. The change in the wording is for clarification only, and there has been no change in the intent of the recommendation.</p> <p>Additional Literature Supports</p> <p>Baren et al., 2001</p>	
<p>Recommendation 5.2</p> <p><i>Clients with asthma should be offered links to community resources.</i></p> <p>(Level IV)</p>	
<p>The wording of this recommendation has been modified to emphasize that it is clients <i>with asthma</i> who should be offered links to community resources. The change in the wording is for clarification only, and there has been no change in the intent of the recommendation.</p> <p>See Appendix K – pg. 13 of this supplement for additions to the published listing of community resources related to smoking cessation.</p>	
<p>Recommendation 5.3</p> <p><i>Clients with asthma should be referred to an asthma educator in their community, if appropriate and available.</i></p> <p>(Level IV)</p>	
<p>The wording of this recommendation has been modified to emphasize that it is clients <i>with asthma</i> who should be referred to an asthma educator. The change in the wording is for clarification only, and there has been no change in the intent of the recommendation.</p> <p>Additional Literature Supports</p> <p>Powell & Gibson, 2006</p>	
<h2>Education Recommendations</h2>	
<p>Recommendation 6.0</p> <p><i>Nurses working with clients with asthma must have the appropriate knowledge and skills to:</i></p> <ul style="list-style-type: none"> ■ Identify the level of asthma control; ■ Provide basic asthma education; and ■ Conduct appropriate referrals to physician and community resources. <p>(Level IV)</p>	
<p>The wording of this recommendation has been modified to emphasize that it is when nurses are working with <i>clients with asthma</i> that they must have the appropriate knowledge and skills. The change in the wording is for clarification only, and there has been no change in the intent of the recommendation.</p>	

Organization and Policy Recommendations

Recommendation 7.0

Access to asthma education should be available within a community.

(Level V)

NEW

This consensus recommendation has been made by the panel in the context of the strong evidence that supports asthma education to achieve and maintain asthma control, and the literature that indicates there is a lack of community asthma education programs.

[Additional Literature Supports](#)

Boulet et al., 1999; Cowie, Cicutto & Boulet, 2001; Gibson et al., 2006

+

Recommendation 8.0

It is essential that asthma educators obtain and maintain the certified asthma educator (CAE) designation.

(Level V)

NEW

This consensus recommendation has been made by the panel in support of the Canadian Asthma Consensus Report (Boulet et al., 1999), which suggests that educational programs for asthma educators that result in national certification may standardize the information provided to clients with asthma, and improve the quality of client education. The Canadian Network for Asthma Care (2006) has established a national certification for asthma educators in Canada, which addresses two key aspects of asthma educator education: up-to-date knowledge about asthma; and a better understanding on the part of educators about educational theory and process (Cicutto et al., 2005). National learning objectives (core curriculum) have been developed to provide a common set of technical and teaching competencies for Canadian asthma educators. Proficiency in these competencies is required for national certification (Canadian Network for Asthma Care, 2006).

[Additional Literature Supports](#)

Boulet et al., 1999; Cicutto et al., 2005; Canadian Network for Asthma Care, 2006

+

Recommendation 9.0

Organizations should have available placebos and spacer devices for teaching, sample templates of action plans, educational materials, and resources for client and nurse education and where indicated, peak flow monitoring equipment.

(Level IV)

✓

Recommendation 10.0

Organizations must promote a collaborative practice model within an interdisciplinary team to enhance asthma care.

(Level IV)

✓

Recommendation 11.0

Organizations need to ensure that a critical mass of health professionals are educated and supported to implement the asthma best practice guidelines in order to ensure sustainability.

(Level V)

✓

Recommendation 12.0

Agencies and funders need to allocate appropriate resources to ensure adequate staffing and a positive healthy work environment in order to provide asthma care consistent with best practice.

(Level V)



Wording of the recommendation has been modified to emphasize that appropriate resources and work environment are necessary to provide *asthma care* consistent with best practice. The change in the wording is for clarification only, and there has been no change in the intent of the recommendation.

[Additional Literature Supports](#)

RNAO, 2007 (in press)

+

<p>Recommendation 13.0</p> <p><i>Healthcare organizations will use key indicators, outcome measurements, and observational strategies that allow them to monitor:</i></p> <ul style="list-style-type: none"> ■ <i>The implementation of guidelines;</i> ■ <i>The impact of the guidelines on optimizing client care; and</i> ■ <i>Efficiencies, or cost effectiveness achieved.</i> <p style="text-align: right;"><i>(Level IV)</i></p>	NEW
<p>A commitment to monitoring the impact of implementing the <i>Adult Asthma Care Guidelines for Nurses: Promoting Control of Asthma</i> best practice guideline is a key step to determine whether or not practice guidelines improve client outcomes. One way to approach this monitoring activity is to describe each recommendation to be implemented in measurable terms, so that the health care team can be involved in the evaluation and quality monitoring process. Refer to pg. 61 of the guideline for some suggested monitoring indicators.</p> <p>Additional Literature Supports</p> <p>Edwards et al., 2005; Hysong, Best & Pugh, 2006</p>	+
<p>Recommendation 14.0</p> <p><i>Nursing best practice guidelines can be successfully implemented only when there are adequate planning, resources, organizational and administrative support, and appropriate facilitation. Organizations may develop a plan for implementation that includes:</i></p> <ul style="list-style-type: none"> ■ <i>An assessment of organizational readiness and barriers to education.</i> ■ <i>Involvement of all members (whether in a direct or indirect supportive function) who will contribute to the implementation process.</i> ■ <i>Dedication of a qualified individual to provide the support needed for the education and implementation process.</i> ■ <i>Ongoing opportunities for discussion and education to reinforce the importance of best practices.</i> ■ <i>Opportunities for reflection on personal and organizational experience in implementing guidelines.</i> <p><i>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 Toolkit is recommended for guiding the implementation of Adult Asthma Care Guidelines for Nurses: Promoting Control of Asthma.</i></p> <p style="text-align: right;"><i>(Level IV)</i></p>	✓
<p>Additional Literature Supports</p> <p>Dobbins, Davies, Danesco, Edwards & Virani, 2005</p>	+

Implementation Strategies

The Registered Nurses' Association of Ontario and the guideline panel have compiled a list of implementation strategies to assist health care organizations or health care 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 have good interpersonal, facilitation and project management skills.
- Conduct an organizational needs assessment related to the care of adults with asthma to identify current knowledge and further educational requirements.
- Create a vision to help direct the change effort and develop strategies for achieving and sustaining the vision.
- Establish a steering committee comprised of key stakeholders and interdisciplinary members committed to leading the change initiative. Identify short term and long-term goals.
- 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).
- Provide organizational support such as having the structures in place to facilitate best practices in asthma care. For example, having an organizational philosophy that reflects the value of best practices through policies and procedures. Develop new assessment and documentation tools (Davies & Edwards, 2004).

Research Gaps and Implications

A number of researchers have looked at health literacy in relation to self-management and chronic illnesses including the health outcomes of individuals living with asthma (Dewalt et al., 2004). In this research some measure of reading level has generally been used as a proxy for literacy. The limited research that has been done in relation to health literacy and asthma self-care demonstrates that higher literacy skills are associated with better self-care management (Dewalt et al., 2004; Paasche-Orlow et al., 2005; Rudd et al., 2004; Sleath et al., 2006; Williams et al., 1998). As indicated, it is clear that the use of action plans in the self-management of asthma is associated with improved asthma control (Gibson et al., 2006) and significantly reduced sudden death (Abramson et al., 2001). Although care providers believe that there is a relationship between literacy and asthma self-control (Forbis & Aligne, 2002), to date no research has been identified examining the relationship between health literacy, the use of action plans and the maintenance of asthma control.

Appendices

The review/revision process did not identify a need for additional appendices; however updates to the following appendices are noted.

Appendix B: Glossary of Terms

The glossary has been updated to remove the term:

Metered Dose Inhaler, Chlorofluorocarbon Propelled – MDI(CFC): This device is no longer available in Canada.

The glossary has been updated to add the term:

Bronchospasm: A contraction of smooth muscle in the walls of the bronchi and bronchioles, causing narrowing of the lumen (airway).

Appendix C: Assessing Asthma Control

In order to be consistent with content changes in Recommendation 2.2, Smoking Cessation is to be added to the list of content areas to be included in an asthma education program (pg. 69 of guideline).

Appendix D: Asthma Medications

The following two new medications have been added to the medication table (pg 74) under *Controllers*:

Medications	Actions	Side Effects	Pharmacokinetics
Anti – Immunoglobulin E (IgE) Neutralizing Monoclonal Antibody (Anti – IgE):			
Omalizumab <ul style="list-style-type: none"> • Xolair® Subcutaneous 150mg. – 375mg. S.C. Q2 – 4 weeks. 	<ul style="list-style-type: none"> • Binds to IgE preventing binding of IgE to the high affinity FcεRI receptor, thereby reducing the amount of free IgE that is available to trigger the allergic-cascade. • This medication prevents free serum IgE from attaching to mast cells and prevents IgE mediated inflammatory changes. 	<ul style="list-style-type: none"> • Anaphylaxis • Malignancy • Immunogenicity • Injection site irritation • Viral infections • Upper respiratory tract infections • Sinusitis • Headache • Sore throat 	<p>Absorption: Average absolute bioavailability of 62%.</p> <p>Distribution: Peak serum concentrations after an average of 7 – 8 days.</p> <p>Metabolism: Liver</p> <p>Excretion: Involved with IgG clearance via liver – bile and in breast milk.</p> <p>Half-Life: 26 days.</p>
Anticholinergic:			
Ciclesonide <ul style="list-style-type: none"> • Alvesco® MDI HFA 100 and 200 µg 	<ul style="list-style-type: none"> • Once inhaled, it is converted in the lungs to its active metabolite, which is a potent glucocorticoid that binds to glucocorticoid receptors in the lung resulting in local pronounced anti-inflammatory activity. 	<ul style="list-style-type: none"> • Paradoxical bronchospasm 	<p>Absorption: The systemic bioavailability for the active metabolite is >50% by using the ciclesonide MDI.</p> <p>Distribution: High protein binding, approximately 1% is available for systemic exposure.</p> <p>Metabolism: Hydrolysed to its pharmacologically active metabolite by esterase enzymes primarily in the lungs.</p> <p>Excretion: Liver – bile</p> <p>Half-Life: Approximately 6 hours.</p>

The following medication, included in the original guideline, has been updated as follows:

Controllers:

p. 74 – **Glucocorticoids (inhaled)** – Fluticasone (Flovent) is now available in HFA in 50, 125 and 250 µg doses.

The following medications have been removed from the table:

Controllers:

p. 74 – **Glucocorticoids (inhaled)** – Fluticasone (Flovent) MDI(CFC) is no longer available in Canada

p. 75 – **Long Acting β₂ Agonists** – Salmeterol (Serevent) MDI(CFC) is no longer available in Canada

p. 76 – **Non-Steroidal Anti-inflammatory** – Sodium cromoglycate (Intal) MDI(CFC) is no longer available in Canada

Appendix G: Sample Action Plans

Sample 1 from Firestone Institute for Respiratory Care St. Joseph's Healthcare, Hamilton Ontario (pg 87 of the guideline) is replaced with the updated version St. Joseph's Healthcare Hamilton "Asthma Treatment Card" below. Reproduced with permission.

RESPIROLOGIST

Dr: _____

Phone: _____

ASTHMA TREATMENT CARD

FIRESTONE INSTITUTE FOR

RESPIRATORY HEALTH

St. Joseph's Healthcare
Hamilton, Ontario

It is important to tell every doctor that
you have asthma and the last date that you
took prednisone.

If your pharmacist substitutes an inhaler

with an unfamiliar name, please have this card
adjusted.

CLINIC NURSE

Name: _____

Phone: _____

Patient Name: _____

This card was brought up to date:
on _____ by _____

Please take this card to every doctor's appointment.

REGULAR TREATMENT

INHALERS	Number of inhalations	Times per day
Advair ()		
QVAR ()		
Flovent ()		
Pulmicort ()		
Atrovent, Combivent ()		
Oxeze ()		
Serevent ()		
Spiriva ()		
Symbicort ()		
Other: _____		

WHAT TO DO IF YOU BECOME WORSE

If ANY of the following occur:

1. Increasing need for "rescue inhaler".
2. Increase in cough and/or sputum.
3. Increase in symptoms on waking.
4. Awakened at night by symptoms.
5. Peak flow rate after "rescue inhaler" is below _____

YOU MUST INCREASE TREATMENT TO:

	Number of inhalations	Times per day
QVAR		
Flovent		
Pulmicort		
Other: _____		

*until you are back to your best,
then return to your usual treatment.*

If your phlegm is yellow or green, add:

RESCUE INHALER

Use as needed for wheeze, shortness of breath, chest
tightness or cough:

Airomir, Bricanyl, Salbutamol, Ventolin, Oxeze

Other: _____

IF YOU CONTINUE TO GET WORSE AFTER

INCREASING TREATMENT

OR if your peak flow rate is below _____

TAKE PREDNISONE TABLETS ()

Day 1	_____	Day 6	_____
Day 2	_____	Day 7	_____
Day 3	_____	Day 8	_____
Day 4	_____	Day 9	_____
Day 5	_____	Day 10	_____

WHEN TO CONTACT YOUR DOCTOR

- If you continue to get worse OR
- If symptoms and/or peak flow rates are not
back to your best in 5 days.


Please note: This action plan is designed
as a three-fold pamphlet.

Sample 2 from Kaiser Permanente Center for Health Research (pg 88 of guideline) is current, with no revisions noted.

Sample 3 from Kingston General Hospital (pg 90 of the guideline) has been updated to reflect that the “Action Plan is not considered “active” until approved and signed by a physician”. Please note that if you are using this action plan as an example to develop an organization specific Asthma Action Plan, you should provide space for a physicians’ signature.

Sample 4 from Toronto Western Hospital at the University Health Network, Toronto, Ontario (pg 92 of the guideline) is replaced with the updated version below.

Reproduced with permission

<p>Management Plan based on Peak Flows</p> <p>It is important to know what to do in case you have a severe asthma attack / episode.</p> <p>Using your best peak flows as your personal best:</p> <p>Predicted peak flowL/m</p> <p>Personal Best peak flowL/m 80 – 100%</p> <p>Peak flow requiring Additional MedicationsL/m 60 – 80%</p> <p>Peak flow requiring urgent Medical attentionL/m Less than 60%</p> <p>N.B. Your Peak flows should be reviewed by your health care provider intermittently.</p>	<p>Signs of Poor Asthma Control</p> <ul style="list-style-type: none"> Having cough, wheeze, chest tightness or shortness of breath during the day or night Need your quick relief inhaler more than 4 times a week (one dose before exercise) Unable to tolerate usual activities Lower peak flows than usual <p>If you are having any of the above symptoms - follow instructions indicated in your Action Plan or see your doctor.</p> <p>EMERGENCY ACTION PLAN WHEN...</p> <ul style="list-style-type: none"> You are not getting relief from your reliever (blue) inhaler You have trouble to breathe and talk Your nails and lips are blue/gray You are feeling very tired, or having fear of dying <p>DO NOT DELAY GET HELP IMMEDIATELY CALL 911</p> <p>You can take 2 –3 puffs of your quick relief inhaler every 10 – 15 minutes on your way to the Hospital, preferably by ambulance.</p>	 <p>Toronto Western Hospital University Health Network</p> <p>Asthma & Airway Centre Management and Action Plan</p> <p>Name: _____</p> <p>Address: _____</p> <p>Phone # _____</p> <p>Family Doctor: _____ Phone # _____</p> <p>Asthma Specialist: _____ Phone # _____</p> <p>Asthma Educator _____ Phone # _____</p> <p>Ambulance Phone # 911</p>
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Developed by Kay Khan RN, CAE - Clinical Nurse Educator

www.Asthmacentre.com

Regular Maintenance Medication

Regular Medication	Drug Action	Dose	Times				Instructions	Common Side effects
			# puffs	# puffs	# puffs	# puffs		

Asthma Action Plan - see Signs for Poor Asthma Control

Step 1. Use your quick reliever puffs every hours if necessary.

Step 2. Start / Increase puffs times a day for days or (Peak Flows back to usual best)
then decrease to your usual maintenance dose.

Step 3. If not getting better or (Peak Flows less than Start Prednisone mg for days. See your Doctor

Step 4. For severe episodes seek Emergency help – see Emergency Action Plan

Keep Your Asthma Under Control

<ul style="list-style-type: none"> Practice preventive measures for asthma triggers Take medications as prescribed Know the actions and side effects of your medications 	<ul style="list-style-type: none"> Always keep your quick relief inhaler with you Don't ignore early warning signs of worsening asthma 	<ul style="list-style-type: none"> Keep follow-up appointments Carry this card with you at all times Consider your asthma when making travel plans
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Appendix H: Peak Flow Monitoring Tips

The labels of peak flow meters incorrectly identified on pg 93 of the guideline are corrected below. The samples illustrated here are the meters that are most commonly used.



Truzone®
Peak Flow Meter



Personal Best®
Peak Flow Meter



Mini Wright®
Peak Flow Meter

Appendix K: Resources

The Educational Resources were reviewed in Appendix K for current contact information. The following updates to contact information for Appendix K are listed below:

- The Asthma Society of Canada: toll free number has been changed to: 1-866-787-4050 Toll Free Website: www.asthma.ca/adults
- The Lung Association (National Office): 1-888-566-LUNG (5864) Website: www.lung.ca
- The Lung Association (Ontario Office): Number remains the same 1-800-972-2636
- The Asthma and Airway Centre – University Health Network: www.uhn.ca/Clinics & Services/clinics/asthma_airway.asp
- Family Physician Airways Group of Canada: Website: www.fpagc.com

The following resources have been added to this appendix to reflect the new focus on smoking cessation in asthma education provided to clients:

Resources for smoking cessation:

National

Canadian Cancer Society: www.cancer.ca

Smoker's Helpline: 1-877-513-5333

Smoker's Helpline Online: www.smokershelpline.ca

Canadian Council on Tobacco Control: www.cctc.ca

Health Canada: www.gosmokefree.ca

Heart and Stroke Foundation of Canada: www.heartandstroke.ca

Physicians for a Smoke Free Canada: www.smoke-free.ca

Provincial (Ontario)

Program Training and Consultation Centre: www.ptcc-cfc.on.ca

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