

Health Care Guideline

Diagnosis and Management of Asthma

The ICSI Diagnosis and Management of Asthma guideline work group endorsed 2016 Global Strategy for Asthma Management and Prevention Report with added qualifications/comments. This report addresses the diagnosis and management of asthma in the pediatric and adult population. The GINA website provided writing group conflict of interest disclosures. These were reviewed and taken into consideration by the ICSI work group.

The ICSI Diagnosis and Management of Asthma guideline work group also endorses the Appendix for the Global Strategy for Asthma Management and Prevention without additional qualifications/comments.

For an abbreviated version of the guideline with tables and charts that highlight key information on diagnosis and treatment, please see the 2016 Global Initiative for Asthma Pocket Guide.

Full citation: Global Initiative for Asthma. Global Strategy for Asthma Management and Prevention, 2016. Available at: <http://www.ginasthma.org>.

Using the ICSI endorsement process, this document has been reviewed by the ICSI Diagnosis and Management of Asthma work group: Bergstrom J, Manney Kurth S, Bruhl E, Heiman M, Kaderabek D, Malkiewicz J, McKenzie M, Moyer L, O'Brien M, Varadarajulu S, Vespa J.

The Global Initiative for Asthma (GINA) is not a sponsor of or affiliated with, nor does it endorse ICSI or the ICSI Asthma work group. GINA has not reviewed ICSI's process for endorsement of guidelines. The following ICSI endorsement and conclusions are solely the consensus of the ICSI Diagnosis and Management of Asthma work group using the ICSI Endorsement Process.

Please note, the previous ICSI Diagnosis and Management of Asthma guideline from July 2012 is being retired.

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Table of Contents

Foreword 1-3

 Methodology2

 Introduction2

 Aims2

 Endorsement with Qualifications of the Global Strategy for Asthma Management
 and Prevention (2016)3

Chapters..... 4-5

Quality Improvement Support..... 6-10

 Aims and Measures7

 Measurement Specifications 8-10

Supporting Evidence..... 11-20

 References 12-13

 Appendix A – ICSI Shared Decision-Making Model.....14-19

 Appendix B – Medication Tables20-23

Disclosure of Potential Conflicts of Interest 24-26

Acknowledgements.....27

Document History and Development 28-29

 Document History28

 ICSI Document Development and Revision Process29

Foreword

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[Return to Table of Contents](#)

Methodology

The GINA work group uses its own system for evaluating evidence. The methodology and description of levels of evidence are explained on pages 8-10 of the document. Since this is an endorsement document, ICSI did not use its own system to evaluate the evidence or classify recommendations.

The ICSI work group did review literature on the following topics as they relate to asthma: action plan, dexamethasone, decadron, nitric oxide, fractional excretion of nitric oxide, cost of care, home peak flow, peak flow, peak flow reliability, asthma follow-up, follow-up on lung function after starting treatment, follow-up on lung function after starting controller treatment, follow-up on lung function after starting medication, ideal asthma follow-up, proper asthma inhaler technique, asthma and inhaler technique, fixed airflow limitation, theophylline, vitamin D and spacers. The literature search included systematic reviews, meta-analysis, randomized controlled trials, and observational trials from the dates of January 1, 2009, to August 1, 2016. There were no age constraints. In addition, work group members provided several articles not found in the literature search.

[Return to Table of Contents](#)

Introduction

According to data from the National Health Interview Survey, the prevalence of asthma in the United States in 2014 was 7.7% in all ages, with 44.7% of persons with asthma reporting having had one or more asthma attacks. In 2011, there were 1.8 million emergency department visits for asthma and in 2012 there were 10.5 million physician office visits with asthma as the primary diagnosis (Centers for Disease Control). Given the prevalence of this disease, the impact on patients and caregivers, and the health care resources it demands, clinical guidelines are critical to standardizing and improving care throughout health care systems.

[Return to Table of Contents](#)

Aims

1. Increase the rate of patients five years and older whose asthma is controlled.
2. Increase the rate of patients five years and older who have appropriate treatment and management of asthma in inpatient care settings.

[Return to Table of Contents](#)

Endorsement of the Global Strategy for Asthma Management and Prevention

The ICSI Diagnosis and Management of Asthma guideline work group endorsed 2016 Global Strategy for Asthma Management and Prevention Report with added qualifications/comments. This report addresses the diagnosis and management of asthma in the pediatric and adult population. The GINA website provided writing group conflict of interest disclosures. These were reviewed and taken into consideration by the ICSI work group.

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Return to Table of Contents

Chapters

Chapter 1. Definition, Description and Diagnosis of Asthma

The work group endorses the content in this chapter with the following qualifications/comments regarding content on page 20 of the GINA document.

A review of the medical literature since 2009 regarding fraction of exhaled nitric oxide (FENO) in asthma diagnosis and management shows mixed results. Ten articles showed benefit in management and diagnosis of adult asthma (*Guo, 2016; Dinh-Xuan, 2015; Honkoop, 2015; Korevaar, 2015; LaForce, 2014; Lemiere, 2014; Syk, 2013; Feitosa, 2012; Jartti, 2012; Cowan, 2010*). FENO may be useful in diagnosis of occupational asthma (*LaForce, 2014; Lemiere, 2014*) and exercise-induced asthma (*Jartti, 2012; Cowan, 2010*). In general, it is more useful in ruling out than ruling in asthma (*Harnan, 2015b*). It is predictive of response to steroids in atopic adults who are steroid naïve (*Guo, 2016; Tang, 2016*). It can measure compliance in adult populations (*Dweik, 2011*). Seven studies showed no or unclear benefit of FENO measurement in the diagnosis and management of adult asthma (*Lehtimäki, 2016; Harnan, 2015b; Scott, 2015; Voorend-van Bergen, 2015; de Jongste, 2009; Gruchalla, 2009; Petsky, 2009*).

In children, two studies showed a benefit in the diagnosis and management of asthma (*Tang, 2016; Petsky, 2015*). Five studies showed no or unclear benefit in the diagnosis and management of pediatric asthma (*Gomersal, 2016; Harnan, 2015a; Lu, 2015; Peirsman, 2014; Feitosa, 2012*).

FENO may play a role in the diagnosis and management of adult asthma. In children, the results are mixed, and it is the consensus of the ICSI work group that FENO measurement in the pediatric population should not be routinely recommended at this time.

Chapter 2. Assessment of Asthma

The work group endorses the content in this chapter with the following additional qualifications/comments regarding content on pages 26 and 31 of the GINA document.

The ICSI work group conducted a literature search regarding the optimal time interval to conduct follow-up lung function testing once treatment is started. While the three to six months suggested by the GINA document may be reasonable, the work group did not find evidence to support any particular time interval for lung function testing.

Chapter 3. Treating Asthma to Control Symptoms and Minimize Risk

The work group endorses the content in this chapter with the following qualifications/comments regarding content on pages 40-47 of the GINA document.

Clinicians may consider increasing the steroid dose before the addition of a LABA.

In 2010, the Food and Drug Administration (FDA) required that long-acting beta agonists product labels reflect the following:

- The use of LABAs is contraindicated without the use of an asthma controller medication such as inhaled corticosteroid. Single-agent LABAs should be used only in combination with an asthma controller medication; they should not be used alone.
- LABAs should be used long-term only in patients whose asthma cannot be adequately controlled on asthma controller medications.

[Return to Table of Contents](#)

Chapters

- LABAs should be used for the shortest duration of time required to achieve control of asthma symptoms and discontinued, if possible, once asthma control is achieved. Patients should then be maintained on an asthma controller medication.
- Pediatric and adolescent patients who require a LABA in addition to an inhaled corticosteroid should use a combination product containing both an inhaled corticosteroid and a LABA to ensure compliance with both medications.

(Food and Drug Administration, 2010)

Patients with symptoms twice a month may not need a daily inhaled corticosteroid. Clinician discretion is needed in determining at what symptom intensity a daily inhaled corticosteroid should be initiated.

Early referral may be considered in Step 4 of the stepwise treatment approach.

In the United States, the FDA has not approval ICS/formoterol for use as a reliever medication.

Chapter 4. Management of Worsening Asthma and Exacerbations

The work group endorses the content in this chapter without additional qualifications/comments.

Chapter 5. Diagnosis of Asthma, COPD and Asthma-COPD Overlap Syndrome (ACOS)

The work group did not review this chapter. The content was beyond the scope of our review.

Chapter 6. Diagnosis and Management of Asthma in Children Five Years or Younger

The work group endorses the content in this chapter with the following qualifications/comments regarding content on pages 113-118 of the GINA document.

The work group reviewed literature pertaining to the use of single- or two-dose dexamethasone for asthma exacerbations. Most studies have been done in children from two years of age to 18 years of age (*Keeney, 2014; Meyer, 2014; Cronin, 2012; Altamimi, 2006*). In a study by Cronin of 245 patients between the ages of 2-16 years, single-dose dexamethasone was just as effective as a three to five day course of prednisolone/prednisone (*Cronin, 2012*). Single-dose dexamethasone was associated with less vomiting (*Cross, 2011*) and better compliance (*Cross, 2011*). Dosing of the dexamethasone was variable in the studies, ranging from 0.3 to 0.6 mg/kg, with maximum doses at 10-16 mg (*Cronin, 2012; Keeney, 2012; Kravitz, 2011*). There is evidence to support the use of single-dose dexamethasone in adults experiencing an acute exacerbation of asthma, but the evidence is not as robust as in children (new study pending).

In the United States, albuterol or levalbuterol rather than salbutamol is used as reliever medications.

Chapter 7. Primary Prevention of Asthma

The work group endorses the content in this chapter without additional qualifications/comments.

Chapter 8. Translation into Clinical Practice

The work group endorses the content in this chapter without additional qualifications/comments.

Return to Table of Contents

The Aims and Measures section is intended to provide guideline users with a menu of measures for multiple purposes, which may include the following:

- Population health improvement measures
- Quality improvement measures for delivery systems
- Measures from regulatory organizations such as The Joint Commission
- Measures that are currently required for public reporting
- Measures that are part of Center for Medicare Services Physician Quality Reporting initiative
- Other measures from local and national organizations aimed at measuring population health and improvement of care delivery

This section provides resources, strategies and measurement for use in closing the gap between current clinical practice and the recommendations set forth in the guideline.

The subdivisions of this section are:

- Aims and Measures

Aims and Measures

1. Increase the rate of patients five years and older whose asthma is controlled.

Measure for accomplishing this aim:

- a. The percentage of pediatric (5-17 years of age) and adult (18-50 years of age) patients who had a diagnosis of asthma and whose asthma was optimally controlled during the measurement period as defined by achieving BOTH of the following:
 - Asthma well controlled as defined by the most recent asthma control tool result available during the measurement period.
 - Patient not at elevated risk of exacerbation as defined by fewer than two emergency department visits and/or hospitalizations due to asthma in the last 12 months.

(MNCM Optimal Asthma Care measure)

2. Increase the rate of patients five years and older who have appropriate treatment and management of asthma in inpatient care settings.

Measures for accomplishing this aim:

- a. Percentage of discharged patients with asthma who are readmitted to the hospital within 30 days.
- b. Percentage of patients with asthma who return to the emergency department for asthma treatment within 30 days of the last visit to the emergency department for asthma treatment.

[Return to Table of Contents](#)

Measurement Specifications

Measurement #1a

The percentage of pediatric (5-17 years of age) and adult (18-50 years of age) patients who had a diagnosis of asthma and whose asthma was optimally controlled during the measurement period as defined by achieving BOTH of the following:

- Asthma well controlled as defined by the most recent asthma control tool result available during the measurement period.
- Patient not at elevated risk of exacerbation as defined by fewer than two emergency department visits and/or hospitalizations due to asthma in the last 12 months.

Notes

This is MN Community Measurement outcome measure on Optimal Asthma Care. See <http://www.mncm.org> for information on this measure.

[Return to Table of Contents](#)

Aims and Measures

Measurement #2a

Percentage of discharged patients with asthma who are readmitted to the hospital with asthma-related diagnosis within 30 days of discharge.

Population Definition

Patients five years and older with hospitalization related to asthma.

Data of Interest

$$\frac{\text{\# of patients readmitted to the hospital with asthma related diagnosis within 30 days of discharge}}{\text{\# of asthma patients who were discharged from an asthma-related hospitalization}}$$

Numerator/Denominator Definitions

Numerator: Number of asthma patients who are readmitted to the hospital with asthma related diagnosis within 30 days of discharge from an asthma-related hospitalization.

Denominator: Number of asthma patients who were discharged from an asthma-related hospitalization.

Method/Source of Data Collection

Identify from EMR patients with an asthma diagnosis who were hospitalized. If a patient had multiple hospitalizations during the target month, select the last hospitalization for asthma. The patient medical records are reviewed for documentation of readmission to the hospital within 30 days of discharge.

Time Frame Pertaining to Data Collection

Monthly.

Notes

This is a process measure, and improvement is noted as an decrease in the rate.

[Return to Table of Contents](#)

Aims and Measures

Measurement #2b

Percentage of patients with asthma who return to the emergency department for asthma treatment within 30 days of the last visit to the emergency department for asthma treatment.

Population Definition

Patients five years and older with emergency department visit related to asthma.

Data of Interest

of patients who return to the emergency department for asthma treatment within 30 days of the last visit to the emergency department for asthma treatment

of asthma patients who were seen in the emergency department for asthma treatment

Numerator/Denominator Definitions

Numerator: Number of asthma patients who return to the emergency department for asthma treatment within 30 days of the last visit to the emergency department for asthma treatment.

Denominator: Number of asthma patients who were seen in emergency department for asthma treatment.

Method/Source of Data Collection

Identify from EMR patients with an asthma diagnosis who were seen in emergency department for asthma treatment. If a patient had multiple emergency department visits during the target month, select the last emergency department visit for asthma. The patient medical records are reviewed for documentation of return to the emergency department for asthma treatment within 30 days of the last visit to emergency department.

Time Frame Pertaining to Data Collection

Monthly.

Notes

This is a process measure, and improvement is noted as an decrease in the rate.

[Return to Table of Contents](#)

The subdivisions of this section are:

- References
- Appendices

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Links are provided for those new references added to this edition (author name is highlighted in blue).

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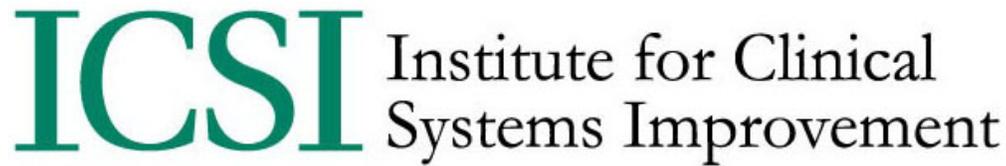
[Return to Table of Contents](#)

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Return to Table of Contents

Appendix A – ICSI Shared Decision-Making Model



The Collaborative Conversation™

Shared Decision-Making and the Translation of Evidence into Practice

A consistent finding from clinical and health services research is the failure to translate research into practice. The translation of evidence into practice can be advanced through the use of shared decision-making since shared decision-making results in evidence being incorporated into patient and clinician consultations.

Shared decision-making (SDM) is a process in which patient and clinicians collaborate to clarify all acceptable options, ensure that the patient is well-informed, and choose a course of care consistent with patient values and preferences and the best available medical evidence (*Minnesota Shared Decision-Making Collaborative [MSDMC], 2011*).

Evidence based guidelines may recommend the use of shared decision-making for decisions in instances where the evidence is equivocal, when patient action or inaction (such as medication adherence or lifestyle changes) can impact the potential outcome, or when the evidence does not indicate a single best recommendation.

SDM is a patient-centered approach that involves a conversation between the patient and the clinician. It is ideal to involve caregivers and family members in these conversations, as well. Family members and caregivers can participate in discussions, ask questions, hear content the patient may miss, and provide invaluable support in decision follow through. Although only patients and clinicians are specifically mentioned throughout this document for brevity purposes, this does not diminish the importance of caregivers and families in patient-centered care.

Both the patient and the clinician bring expertise to the shared decision-making conversation. Clinicians' expertise includes disease etiology, prognosis, options for treatment including the burden and benefit to the patient, and outcome probabilities. Patients' expertise lies in their knowledge of their risk tolerance, body, priorities, family and financial issues, as well as their daily experience with the condition (adapted from "Making Shared Decision-Making a Reality. No Decision About Me, Without Me." Coulter, A., Collins, A., The King's Fund 2011).

Treatment options vary in their burden on a patient. SDM offers an opportunity to help the patient select a treatment to which he/she can adhere. When conversations discussing options occurs, patients and clinicians are actively engaged while considering the attributes and issues of the available options. This empathic approach results in the clinician and patient co-creating a decision and a plan of care (adapted from Montori, V., the Mayo Clinic KER UNIT, April 2015). Decision aids can be supportive of this conversation when they communicate the best available evidence to inform the patient and clinician discussion.

Without a conversation, clinicians may make assumptions about what the patient prefers. This creates the potential for discrepancies between what clinicians assume and what patients want resulting in a "preference misdiagnosis" (adapted from Health Policy Publishing, LLC, May 2013).

Difficulty in initiating a conversation is cited by patients and clinicians as one of the barriers to shared decision-making. To address this impediment, ICSI worked with patients, practicing clinicians, and other stakeholders to develop the Collaborative Conversation™ model for use across the care continuum.

[Return to Table of Contents](#)

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Collaborative Conversation™

A collaborative approach towards decision-making is a fundamental tenet of Shared Decision-Making (SDM). The Collaborative Conversation™ is an inter-professional approach that nurtures relationships, enhances patients' knowledge, skills and confidence as vital participants in their health, and encourages them to manage their health care. Within a Collaborative Conversation™, the perspective is that the patient, rather than the clinician, knows which course of action is most consistent with the patient's values and preferences.

Use of Collaborative Conversation™ elements and tools is even more necessary to support patient, care clinician and team relationships when patients and families are dealing with high stakes or highly charged issues. A diagnosis of a life-limiting illness is one example of such a circumstance.

The overall objective for the Collaborative Conversation™ approach is to create an environment in which the patient, family, and care team work collaboratively to reach and carry out a decision that is consistent with the patient's values and preferences along with the best available evidence. A rote script, completed form or checklist does not constitute this approach. Rather it is a set of skills employed appropriately for the specific situation. These skills need to be used artfully to address all aspects of the person involved in making a decision: cognitive, affective, social and spiritual.

Key communication skills help build the collaborative conversation approach. These skills include: (adapted from O'Connor, Jacobsen, "Decisional Conflict: Supporting People Experiencing Uncertainty about Options Affecting their Health" [2007], and Bunn H, O'Connor AM, Jacobsen MJ, "Analyzing Decision Support and Related Communication" [1998, 2003]).

1. Listening skills:

Encourage patient to talk by providing prompts to continue such as *go on, and then?, uh huh,* or by repeating the last thing a person said, *It's confusing.*

Paraphrase content of messages shared by patient to promote exploration, clarify content and to communicate that the person's unique perspective has been heard. The clinician should use their own words rather than just parroting what they heard.

Reflection of feelings usually can be done effectively once trust has been established. Until the clinician feels that trust has been established, short reflections at the same level of intensity expressed by the patient without omitting any of the message's meaning is appropriate. Reflection in this manner communicates that the clinician understands the patient's feelings and may work as a catalyst for further problem solving. For example, the clinician identifies what the person is feeling and responds back in his/her own words like this: *"So, you're unsure which choice is the best for you."*

Summarize the person's key comments and reflect them back to the patient. The clinician should condense several key comments made by the patient and provide a summary of the situation. This assists the patient in gaining a broader understanding of the situation rather than getting mired down in the details. The most effective times to do this are midway through and at the end of the conversation. An example of this is, *"You and your family have read the information together, discussed the pros and cons, but are having a hard time making a decision because of the risks."*

Perception checks ensure that the clinician accurately understands a patient or family member perspective, and may be used as a summary or reflection. They are used to verify that the clinician is interpreting the message correctly. The clinician can say, *"So you are saying that you're not ready to make a decision at this time. Am I understanding you correctly?"*

[Return to Table of Contents](#)

Appendix A – ICSI Shared Decision-Making Model

2. Questioning Skills:

Open and Closed questions are both used with the emphasis on open questions. Open questions ask for clarification or elaboration and cannot have a yes or no answer. An example would be, *“What else would influence you to choose this?”* Closed questions are appropriate if specific information is required such as, *“Does your daughter support your decision?”*

Other skills such as summarizing, paraphrasing, and reflection of feeling can be used in the questioning process so that the patient doesn't feel pressured by questions.

Verbal tracking, referring back to a topic the patient mentioned earlier, is an important foundational skill (Ivey & Bradford-Ivey). An example of this is the clinician saying, *“You mentioned earlier...”*

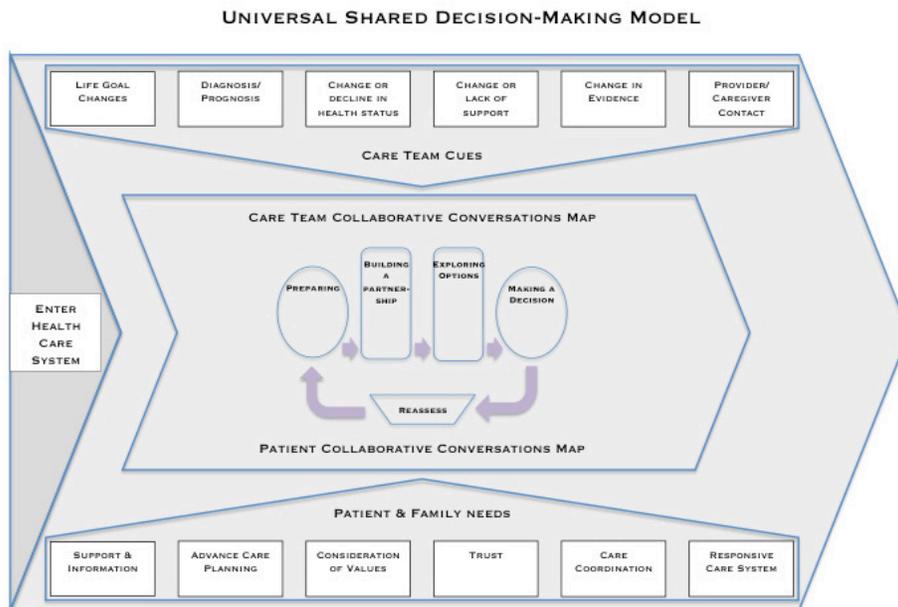
3. Information-Giving Skills:

Providing information and **providing feedback** are two methods of information giving. The distinction between providing information and giving advice is important. Information giving allows a clinician to supplement their knowledge and helps to keep the conversation patient centered. Giving advice, on the other hand, takes the attention away from the patient's unique goals and values, and places it on those of the clinician.

Providing information can be sharing facts or responding to questions. An example is, *“If we look at the evidence, the risk is...”* **Providing feedback** gives the patient the clinician's view of the patient's reaction. For instance, the clinician can say, *“You seem to understand the facts and value your daughter's advice.”*

When to Initiate a Collaborative Conversation™

Certain seminal events occur along the care continuum creating especially opportune times for collaborative conversations. More than one of these opportunities may present at a time and they will occur in no specific order.



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Table 1

[Return to Table of Contents](#)

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Cues for the Care Team to Initiate a Collaborative Conversation™:

- Life goal changes: *Patient's priorities change related to things the patient values such as activities, relationships, possessions, goals and hopes, or things that contribute to the patient's emotional and spiritual well-being.*
- Diagnosis/prognosis changes: *Additional diagnoses, improved or worsening prognosis.*
- Change or decline in health status: *Improving or worsening symptoms, change in performance status or psychological distress.*
- Change or lack of support: *Increase or decrease in caregiver support, change in caregiver, change in caregiver status, change in financial standing, difference between patient and family wishes.*
- Disease progression: *Change in physical or psychological status as a result of the disease progression.*
- Clinician/caregiver contact: *Each contact between the clinician/ caregiver presents an opportunity to reaffirm with the patient that their care plan and the care they are receiving is consistent with their values.*

Patient and Family Needs within a Collaborative Conversation™

- Request for support and information: *Decisional conflict is indicated by, among other things, the patient verbalizing uncertainty or concern about undesired outcomes, expressing concern about choice consistency with personal values, exhibiting behavior such as wavering, delay, preoccupation, distress or tension. Support resources may include healthcare professionals, family, friends, support groups, clergy and social workers. When patient expresses need for information regarding options and their potential outcomes, the patient should understand the key facts about their options, risks and benefits, and have realistic expectations. The method and pace with which this information is provided to the patient should be appropriate for the patient's capacity at that moment.*
- Advance Care Planning: *With the diagnosis of a life-limiting illness, conversations around advance care planning open up. This is an opportune time to expand the scope of the conversation to other types of decisions that will need to be made as a consequence of the diagnosis of a life-limiting illness.*
- Consideration of Values: *The personal importance a patient assigns potential outcomes must be respected. If the patient is unclear how to prioritize his/her preferences, value clarification can be achieved through the use of decision aids. Detailing the benefits and harms of potential outcomes in terms of how they will directly affect the patient, and through collaborative conversations with the clinician.*
- Trust: *The patient must feel confident that his/her preferences will be communicated to and respected by all caregivers.*
- Care Coordination: *Should the patient require care coordination; this is an opportune time to discuss the other types of care related decisions that need to be made. These decisions will most likely need to be revisited often. Further, the care delivery system must be capable of delivering coordinated care throughout the continuum of care.*
- Responsive Care System: *The care system needs to support the components of patient and family centered care so the patient's values and preferences are incorporated into the care they receive throughout the care continuum.*

[Return to Table of Contents](#)

Appendix A – ICSI Shared Decision-Making Model

The Collaborative Conversation™ Map is the heart of this process. The Collaborative Conversation Map™ can be used as a stand-alone tool that is equally applicable to clinicians and patients as shown in Table 2. Clinicians use the map as a clinical workflow. It helps get the shared decision-making process initiated and provides navigation for the process. Care teams can use the Collaborative Conversation™ to document team best practices and to formalize a common lexicon. Organizations can build fields from the Collaborative Conversation™ Map in electronic medical records to encourage process normalization. Patients use the map to prepare for decision-making, to help guide them through the process and to share critical information with their loved ones.

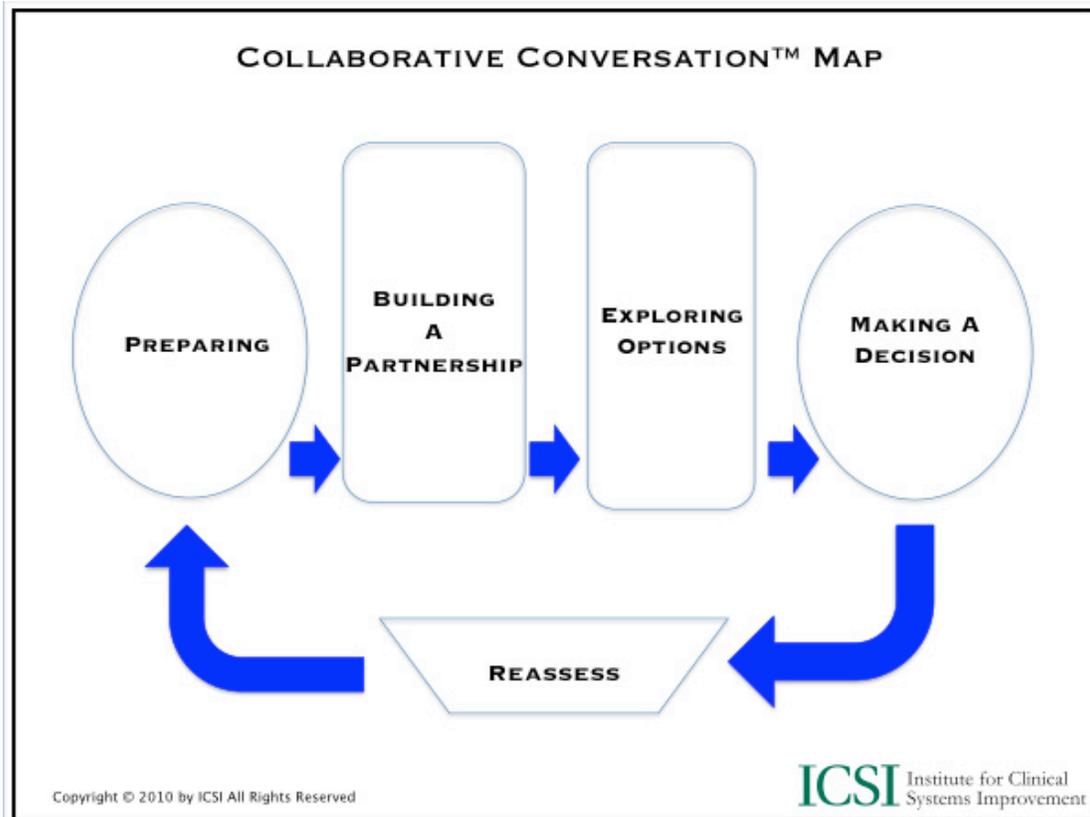


Table 2

Return to Table of Contents

Appendix A – ICSI Shared Decision-Making Model

Evaluating Shared Decision-Making

It has proven challenging to assess shared decision-making. Measuring shared decision-making remains important for continued adoption of shared Decision-Making as a mechanism for translating evidence into practice, promoting patient centered care, and to understand the impact of shared decision-making on patient experience, outcomes and revenues. Many assessments exist, but they are often proxy measures.

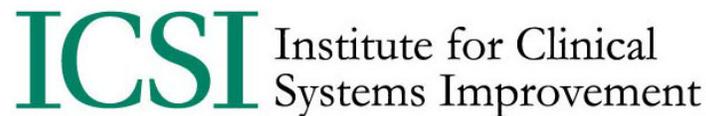
Two suggested methods for measuring shared Decision-Making are the CollaboRATE tool and the SURE Test. These two tools measure different aspects of shared Decision-Making, as described below.

The [CollaboRATE tool](http://www.collaboratescore.org/) measures the level of shared Decision-Making in the clinical encounter from the patient's perspective. It is a brief patient reported measure of shared decision-making. The tools and guidance on their use can be found at <http://www.collaboratescore.org/>.

The [SURE Test](#) is a brief screening questionnaire the patient uses to assess their readiness and capacity to make a decision or to determine whether they are comfortable with the choice that was made. In other words, it provides information on how likely a patient may be experiencing decisional conflict. If the SURE screening test indicates decisional conflict may exist, the [Decisional Conflict Scale](#) should be completed in order to assess clinically significant decisional conflict.

Shared decision-making is a useful mechanism for translating evidence into practice. While research on the impacts of shared decision-making continues to grow, there is mounting evidence that both patients and clinicians benefit from SDM. Shared decision-making offers the opportunity to bring evidence and the patient's values into the patient/clinician discussion of health choices.

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[Return to Table of Contents](#)

Appendix B – Asthma Medication Summary Tables

| Medication Class: Combination – Inhaled Corticosteroids (ICS) and Long-Acting Beta2-Agonist | | | | | |
|--|--------------------|--|--|--|---|
| Medication Name | Indication | Doses/Strengths | Priming | Cleaning | Website Link |
| Advair Diskus (fluticasone propionate and salmeterol) | 4 years and older | One inhalation twice daily 100/50 mcg, 250/50, 500/50 (60 doses) | No priming necessary. | Wipe mouthpiece with dry cloth. | https://www.advair.com/about-advair.html |
| Advair HFA (fluticasone and salmeterol) | 12 years and older | Two inhalations twice daily 45/21mcg, 115/21, 230/21 per inhalation (60 or 120 actuations) | New: Shake 5 seconds then spray, repeat 3 more times, shaking between. If not used in 4 weeks or if dropped: 2 test sprays, shaking between. | Clean spray hole weekly with a dry cotton swab. Gently twist swab to remove any medication. Wipe mouthpiece with damp tissue and allow to dry. Do not remove canister from actuator. | https://www.advair.com/about-advair.html |
| Breo Ellipta DPI (fluticasone furoate and vilanterol) | 18 years and older | One inhalation once daily 100/25 mcg (14 or 30 doses) | No priming necessary. | Clean mouthpiece with clean, dry tissue if needed. | http://www.mybreo.com/asthma.html |
| Dulera HFA (mometasone furoate, formoterol fumarate dehydrate) | 12 years and older | Two inhalations twice daily 100/5 mcg or 200/5 mcg (60 or 120 actuations) | New and if not used in > 5 days: 4 sprays, shake between. | Clean mouthpiece with clean, dry tissue weekly. | https://www.dulera.com/mometasone_formoterol/dulera/index.jsp |
| Symbicort HFA (budesonide and formoterol fumarate dihydrate) | 12 years and older | Two inhalations twice daily 80.4/4.5 mcg, 160/4.5 mcg | New and if not used in 7 days OR dropped: 2 test sprays, shake 5 seconds between. | Wipe inside and outside of mouthpiece with clean, dry cloth. Do not take inhaler apart. | https://www.mysymbicort.com/asthma.html |

[Return to Table of Contents](#)

Appendix B – Asthma Medication Summary Tables

| Medication Class: Long-acting Beta2-Agonist (**Use with Corticosteroids) | | | | | |
|---|---|---|---|---|---|
| Medication Name | Indication | Doses/Strengths | Priming | Cleaning | Website Link |
| Serevent Diskus DPI (salmeterol xinafoate) | Four years and older Exercise-induced asthma | One inhalation twice daily 50 mcg (60 doses) One puff 30 minutes prior to exercise | No priming necessary | Wipe mouthpiece with dry cloth. | Not available |
| Medication Class: Inhaled Corticosteroids (ICS) | | | | | |
| Aerospan HFA (flunisolide) | 6 years and older | Ages 6-11: 1-2 puffs twice daily Ages 12 and older: 2-4 puffs twice daily 80 mcg (60 or 120 doses) | New and if not used for 14 days: 2 test sprays | No cleaning required. | http://aerospanrx.com/ |
| Alvesco HFA (ciclesonide) | 12 years and older | 80-320 mcg twice daily 80 mcg, 160 mcg (60 actuations) | New and if not used for >= 10 days: 3 test sprays | Clean mouthpiece and front hole where medicine comes out with clean, dry tissue weekly. | www.alvesco.us |
| Arnuity Ellipta DPI (fluticasone furoate) | 12 years and older | 1 inhalation, once daily 100 mcg, 200 mcg (30 doses) | No priming necessary | Clean mouthpiece with clean, dry tissue if needed. | www.arnuity.com |
| Asmanex Twisthaler DPI (mometasone furoate) | 4 years and older | Ages 4-11: 110 mcg once daily Ages 12 and older: 220 mcg once daily-440 twice daily 110 mcg, 220 mcg (14, 30, 60, or 120 doses) | No priming necessary | Wipe mouthpiece with dry cloth after each use. | http://www.asmanex.com/asmanex-hfa/index.xhtml |

[Return to Table of Contents](#)

Appendix B – Asthma Medication Summary Tables

| Medication Class: Inhaled Corticosteroids (ICS) (continued) | | | | | |
|--|-----------------------------|--|---|--|--|
| Medication Name | Indication | Doses/Strengths | Priming | Cleaning | Website Link |
| Flovent HFA (fluticasone propionate) | 4 years and older | Ages 4-11: 88 twice daily Ages 12 and older: 88-440 mcg twice daily 44 mcg, 110 mcg, 220 mcg (120 dose) | New: Shake 5 seconds then spray, repeat 3 more times, shaking between. If not used in 7 days: shake 5 seconds then 1 spray. | Clean spray hole weekly with dry cotton swab. Gently twist swab to remove any medications. Wipe mouthpiece with damp tissue and allow to dry. Don't remove canister from actuator. | https://www.gsksource.com/floventhfa |
| Flovent Diskus DPI (fluticasone propionate) | 4 years and older | Ages 4-11: 50-100 mcg twice daily Ages 12 and older: 100-1000 mcg twice daily 50 mcg, 100 mcg, 250 mcg (60 doses) | No priming necessary. | Wipe mouthpiece with dry cloth. | Not available |
| Pulmicort Flexhaler DPI (budesonide) | 6 years and older | Ages 6-17: 180-360 mcg twice daily Ages 18 and older: 360-720 mcg twice daily 90 mcg per dose (60 doses) 180 mcg per dose (120 doses) | New: hold upright, remove white lid, twist and click brown grip two times. | Wipe mouthpiece with dry cloth weekly. | www.pulmicortflexhalertouchpoints.com |
| Pulmicort Respules nebulizer (budesonide) | 12 months to 8 years of age | 0.5-1.0mg total daily dose 0.25 mg, 0.5 mg, or 1.0 mg per unit | Nebulized medications do not require priming. | Clean nebulizer per manufacturer's instructions. | https://www.pulmicortrespules.com/ |
| QVAR HFA (beclomethasone dipropionate) | 5 years and older | Ages 5-11: 40-80 mcg twice daily Ages 12 and older: 40-320 mcg twice daily 40 mcg, 80 mcg (120 actuations) | New and if not used for 10 days: 2 test sprays. | Wipe mouthpiece with dry cloth weekly. | www.qvar.com/asthma-control-inhaler-medicine/default.aspx |

Return to Table of Contents

Appendix B – Asthma Medication Summary Tables

| Medication Class: Short-acting Beta2-Agonist | | | | | |
|---|--|---|---|--|---|
| Medication Name | Indication | Doses/Strengths | Priming | Cleaning | Website Link |
| Accuneb nebulizer (albuterol sulfate) | Treatment for bronchospasm: 2 to 12 years of age | Nebulize 3-4 times a day as needed 0.63 mg albuterol/ 3 mL 1.25 mg albuterol/ 3 mL | Nebulized medications do not require priming. | Clean nebulizer per manufacturer's instructions. | Not available |
| Albuterol Nebulizer (0.083%) | Treatment for bronchospasm: 2 years and older | Nebulize 2.5 mg (one vial) 3-4 times a day 2.5 mg/ 3 mL | Nebulized medications do not require priming. | Clean nebulizer per manufacturer's instructions. | Not available |
| ProAir HFA (albuterol sulfate) | Treatment for bronchospasm: 4 years and older | 2 inhalations every 4-6 hours 90 mcg (200 doses) | New and if not used in > 2 weeks: 3 test sprays, shake before each spray. | Clean sleeve weekly with warm running water, allow to completely dry before using. | http://proair.com/hfa/about/ |
| Proventil HFA (albuterol sulfate) | Treatment for bronchospasm: 4 years and older | 2 inhalations every 4-6 hours 90 mcg (200 doses) | New and if not used in > 2 weeks: 4 test sprays. | Clean sleeve weekly with warm running water, allow to completely dry before using. | http://www.proventilhfa.com/pfha/index.xhtml |
| Ventolin HFA (albuterol sulfate) | Treatment for bronchospasm: 4 years and older | 2 inhalations every 4-6 hours 90 mcg (200 doses) | New and if not used in > 2 weeks: 4 test sprays. | Clean sleeve weekly with warm running water, allow to completely dry before using. | http://www.ventolin.com/ |
| Xopenex Nebulizer (levalbuterol) | Treatment for bronchospasm: 6 years and older | Ages 6-11: Nebulize 0.31-0.63 mg three times a day Ages 12 and older: Nebulize 0.63-1.25 mg three times a day 0.31/3 mL, 0.63/3 mL, 1.25/3 mL | Nebulized medications do not require priming. | Clean nebulizer per manufacturer's instructions. | Not available |
| Xopenex HFA (levalbuterol tartare) | Treatment for bronchospasm: 4 years and older | 2 inhalations every 4-6 hours 45 mcg (200 doses) | New and if not used in >3 days: 4 test sprays. | Clean sleeve weekly with warm running water, allow to completely dry before using. | www.xopenex.com/ |

| Medication Class: Long-acting Anticholinergic | | | | | |
|--|--------------------|---|---|---|---|
| Medication Name | Indication | Doses/Strengths | Priming | Cleaning | Website Link |
| Spiriva Respimat (tiotropium bromide) | 12 years and older | 2 puffs once daily 1.25 mcg per puff | If not used for 3 days, release 1 puff towards the ground. If not used for > 21 days, turn clear base half a turn in the direction of the arrows until it clicks, open cap, and point inhaler toward group until a mist is visible. Repeat that process three more times. | Clean the mouthpiece, including the metal part inside the mouthpiece, with a damp cloth or tissue only, at least once a week. | https://www.spiriva.com/asthma/ |

Return to Table of Contents

ICSI has long had a policy of transparency in declaring potential conflicting and competing interests of all individuals who participate in the development, revision and approval of ICSI guidelines and protocols.

In 2010, the ICSI Conflict of Interest Review Committee was established by the Board of Directors to review all disclosures and make recommendations to the board when steps should be taken to mitigate potential conflicts of interest, including recommendations regarding removal of work group members. This committee has adopted the Institute of Medicine Conflict of Interest standards as outlined in the report, *Clinical Practice Guidelines We Can Trust* (2011).

Where there are work group members with identified potential conflicts, these are disclosed and discussed at the initial work group meeting. These members are expected to recuse themselves from related discussions or authorship of related recommendations, as directed by the Conflict of Interest committee or requested by the work group.

The complete ICSI policy regarding Conflicts of Interest is available at <http://bit.ly/ICSICOI>.

Funding Source

The Institute for Clinical Systems Improvement provided the funding for this guideline revision. ICSI is a not-for-profit, quality improvement organization based in Bloomington, Minnesota. ICSI's work is funded by the annual dues of the member medical groups and five sponsoring health plans in Minnesota and Wisconsin. Individuals on the work group are not paid by ICSI but are supported by their medical group for this work.

ICSI facilitates and coordinates the guideline development and revision process. ICSI, member medical groups and sponsoring health plans review and provide feedback but do not have editorial control over the work group. All recommendations are based on the work group's independent evaluation of the evidence.

[Return to Table of Contents](#)

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[Return to Table of Contents](#)

ICSI seeks review from members and the public during the revision process.

Member Review

All ICSI documents are available for member review at two points in the ICSI revision process. The ICSI Response Report is sent to members at the beginning of a document revision. The goal of this report is to solicit feedback about the guideline, including but not limited to the algorithm, content, recommendations, and implementation. Members are also welcome to participate in the public comment period (see below).

The work group would like to thank the following organizations for participating in the Diagnosis and Management of Asthma pre-revision review:

- *HealthPartners Medical Group and Regions Hospital*
- *Hudson Physicians*

Public Comment

ICSI makes a draft of the guideline available to the public on the ICSI website. The public is invited to comment in an effort to get feedback prior to its finalization. All comments will be reviewed by the ICSI facilitator and work group members when needed. ICSI work group may or may not make changes to the guideline based on public comment responses.

Because the ICSI Diagnosis and Management of Asthma guideline is an endorsement, it was not available for public comment.

Invited Reviews

For some guidelines, ICSI will invite experts in the community to comment on a guideline draft prior to finalization. This is done during the public comment period.

No invited review was done for this endorsement.

ICSI Patient Advisory Council (PAC)

The ICSI Patient Advisory Council responds to any guideline review requests put forth by ICSI facilitators and work groups. The PAC members may be involved at the beginning, middle, and/or end of the revision process. Patient advisors who serve on the council consistently share their experiences and perspectives in either a comprehensive or partial review of a document.

The ICSI Patient Advisory Council did not review the Diagnosis and Management of Asthma guideline.

[*Return to Table of Contents*](#)

| |
|---|
| Document Drafted Adults: Mar – Jun 1994 Peds: May – Aug 1993 |
| First Edition Jun 1998 |
| Second Edition Jul 1999 |
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| Eleventh Edition Begins Dec 2016 |

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◀ The next revision will be no later than April 2021.

Document History

- Diagnosis and Outpatient Management of Asthma guideline
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Critical Review Aug-Sep 2004
First Edition Jan 2005
To produce the:
Diagnosis and Management of Asthma guideline
Eighth Edition Jan 2008

[Return to Table of Contents](#)

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ICSI Document Development and Revision Process

Overview

Since 1993, the Institute for Clinical Systems Improvement (ICSI) has developed more than 60 evidence-based health care documents that support best practices for the prevention, diagnosis, treatment or management of a given symptom, disease or condition for patients.

Audience and Intended Use

The information contained in this ICSI health care guideline is intended primarily for health professionals and other expert audiences.

This ICSI health care guideline should not be construed as medical advice or medical opinion related to any specific facts or circumstances. Patients and families are urged to consult a health care professional regarding their own situation and any specific medical questions they may have. In addition, they should seek assistance from a health care professional in interpreting this ICSI health care guideline and applying it in their individual case.

This ICSI health care guideline is designed to assist clinicians by providing an analytical framework for the evaluation and treatment of patients, and is not intended either to replace a clinician's judgment or to establish a protocol for all patients with a particular condition.

Document Development and Revision Process

The development process is based on a number of long-proven approaches and is continually being revised based on changing community standards. The ICSI staff, in consultation with the work group and a medical librarian, conduct a literature search to identify systematic reviews, randomized clinical trials, meta-analysis, other guidelines, regulatory statements and other pertinent literature. This literature is evaluated based on the GRADE methodology by work group members. When needed, an outside methodologist is consulted.

The work group uses this information to develop or revise clinical flows and algorithms, write recommendations, and identify gaps in the literature. The work group gives consideration to the importance of many issues as they develop the guideline. These considerations include the systems of care in our community and how resources vary, the balance between benefits and harms of interventions, patient and community values, the autonomy of clinicians and patients and more. All decisions made by the work group are done using a consensus process.

ICSI's medical group members and sponsors review each guideline as part of the revision process. They provide comment on the scientific content, recommendations and implementation strategies. This feedback is used by and responded to by the work group as part of their revision work. Final review and approval of the guideline is done by ICSI's Committee on Evidence-Based Practice. This committee is made up of practicing clinicians and nurses, drawn from ICSI member medical groups.

Implementation Recommendations and Measures

These are provided to assist medical groups and others to implement the recommendations in the guidelines. Where possible, implementation strategies are included that have been formally evaluated and tested. Measures are included that may be used for quality improvement as well as for outcome reporting. When available, regulatory or publicly reported measures are included.

Document Revision Cycle

Scientific documents are revised as indicated by changes in clinical practice and literature. ICSI staff monitors major peer-reviewed journals for any pertinent evidence that would affect a particular guideline and recommendation.

Endorsement Process

The endorsement process includes an internal review by ICSI staff followed by a thorough discussion and consideration of the external document by work group members. The work group adds any qualifications/comments deemed necessary by consensus of the group. The ICSI work group may also provide additional implementation tools to complement the content of the endorsed guideline.

[Return to Table of Contents](#)

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