

July 2019 ~ Resource #350702

## Improving Asthma Care

**Abbreviations:** CTS = Canadian Thoracic Society; ED = emergency department; GINA = Global Initiative for Asthma; ICS = inhaled corticosteroid; LABA = long-acting beta-2 agonist; MDI = metered dose inhaler; NHLBI = National Heart, Lung, and Blood Institute; PEF = peak expiratory flow; SABA = short-acting beta-2 agonist

| Goal                         | Suggested Strategies or Resources  |
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| Prevent and treat influenza. | <ul style="list-style-type: none"> <li>• Vaccinate all patients six months and older, including pregnant women, yearly.<sup>1,2,12</sup></li> <li>• The CDC provides up-to-date info on flu prevention, treatment, and geographic activity, and links to patient education resources, at <a href="https://www.cdc.gov/flu/professionals/index.htm">https://www.cdc.gov/flu/professionals/index.htm</a>.</li> <li>• The Public Health Agency of Canada has information and materials for patients and healthcare professionals about flu prevention and treatment at <a href="https://www.canada.ca/en/public-health/services/diseases/flu-influenza.html">https://www.canada.ca/en/public-health/services/diseases/flu-influenza.html</a>.</li> <li>• Choose the right flu vaccine for the patient. The live intranasal flu vaccine (<i>FluMist</i>) should not be used in patients with severe asthma (on oral or high-dose inhaled corticosteroids, active wheezing), or those with medically attended wheezing within the seven days prior to vaccination.<sup>2</sup> For more information to help you choose the right flu vaccine for your patient, get our chart, <i>Flu Vaccines</i> (U.S. Subscribers) (Canadian Subscribers).</li> <li>• Provide immunizations in your pharmacy. Technicians can learn <i>The Basics of Immunization and Vaccines</i> from our technician tutorial.</li> </ul> |
| Prevent pneumonia.           | <ul style="list-style-type: none"> <li>• See our toolbox, <i>Preventing and Treating Community-Acquired Pneumonia</i>, for information on pneumonia vaccination and other prevention strategies, including patient education resources.</li> <li>• For help determining which adults need which pneumonia shot and when, get our chart, <i>Pneumococcal Vaccination in Adults: Who Gets What and When?</i> (U.S. Subscribers) (Canadian Subscribers).</li> <li>• Canadian subscribers can also get our chart, <i>Pneumococcal Vaccination in Kids: Who Gets What and When?</i></li> </ul>  |
| Help patients quit smoking.  | <ul style="list-style-type: none"> <li>• Get our CE, <i>Improving the Chances for Patients to Quit Smoking</i>.</li> <li>• Get our chart, <i>Smoking Cessation Drug Therapy</i>, and our CE, <i>Smoking Cessation Aids: Helping Patients Navigate their Options</i>, for help choosing smoking cessation pharmacotherapy. Includes the Fagerstrom Test for Cigarette Dependence.</li> <li>• For practical tips and more resources, see our toolbox, <i>Smoking Cessation: Helping Patients Who Use Tobacco</i>.</li> </ul>   |

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| Goal   | Suggested Strategies or Resources  |
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| Educate patients and caregivers about asthma.                                | <ul style="list-style-type: none"> <li>• The NIH's <i>So You Have Asthma: A Guide for Patients and Their Families</i> (available at <a href="http://www.nhlbi.nih.gov/files/docs/public/lung/SoYouHaveAsthma_PRINT-reduced-filesize.pdf">http://www.nhlbi.nih.gov/files/docs/public/lung/SoYouHaveAsthma_PRINT-reduced-filesize.pdf</a>) covers symptoms, treatments, monitoring, and more.</li> <li>• Canadians can get patient/caregiver information from the Canadian Lung Association at <a href="https://www.lung.ca/asthma">https://www.lung.ca/asthma</a>.</li> <li>• Use our asthma conversation starter to help guide discussions with patients.</li> </ul>   |
| Ensure patients are on the right inhalers for their disease severity.        | <p>--For treatment specific to <b>children</b>, see our algorithm, <i>Stepwise Pharmacotherapy of Pediatric Asthma</i>--</p> <ul style="list-style-type: none"> <li>• <b>Mild asthma in adults</b> (e.g., symptoms &lt;daily<sup>3</sup>): GINA guidelines recommend use of low-dose ICS as needed <b>with</b> SABA, or as-needed low-dose ICS/formoterol (max total daily formoterol dose 72 mcg [i.e., two puffs every four hours]).<sup>17</sup> Older guidelines prefer inhaled SABA (e.g., albuterol [salbutamol, Canada]) for acute symptoms.<sup>3,8</sup> <ul style="list-style-type: none"> <li>• Compared to as-needed inhaled SABA alone, as-needed low-dose budesonide/formoterol prevents a hospital visit, hospitalization, or steroid burst in about 1 in 16 adults/year [Evidence level A-1].<sup>5</sup> Patients don't seem to have more exacerbations using this combo as-needed than with a daily low-dose ICS, with half the steroid exposure [Evidence level B-1].<sup>16</sup></li> <li>• Another option is <b>scheduled</b> low-dose ICS plus as-needed reliever.<sup>3,8,9,17</sup> Use our chart, <i>Inhaled Corticosteroid Dose Comparison in Asthma</i>, to identify low doses for each inhaler.</li> </ul> </li> <li>• <b>More severe asthma in adults</b> (e.g., daily symptoms<sup>3</sup>): Switch to a scheduled LABA/ICS combo at a similar ICS dose (preferred in patients 12 years and older due to superior efficacy<sup>8,9</sup>) <b>OR</b> step up to a medium-dose ICS.<sup>8,9,17</sup> Then, if needed, add a LABA or increase to medium-dose ICS if on scheduled LABA/ICS combo (high dose not usually needed).<sup>3,8,17</sup></li> <li>• Levalbuterol has not been proven more effective than albuterol.<sup>3</sup></li> <li>• For a stepwise approach to managing asthma, get the NHLBI's National Asthma Education and Prevention Program at <a href="http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.pdf">http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.pdf</a>, or GINA guidelines (<a href="http://ginasthma.org/">http://ginasthma.org/</a>). A GINA pocket guide is available for difficult-to-treat and severe asthma patients at <a href="https://ginasthma.org/wp-content/uploads/2019/04/GINA-Severe-asthma-Pocket-Guide-v2.0-wms-1.pdf">https://ginasthma.org/wp-content/uploads/2019/04/GINA-Severe-asthma-Pocket-Guide-v2.0-wms-1.pdf</a>.<sup>6</sup></li> <li>• Get our chart, <i>Comparison of Inhaled Asthma Meds</i> (U.S. Subscribers) (Canadian Subscribers), for dosing and cost.</li> <li>• Reserve nebulizers for patients who cannot use an MDI with valved holding chamber (preferred over spacer).<sup>3,9</sup></li> </ul> |
| Minimize adverse effects from asthma medications.<br><br><i>Continued...</i> | <ul style="list-style-type: none"> <li>• Choose the inhaled route over oral or parenteral routes when possible.<sup>3,9,17</sup></li> <li>• Spacer or valved holding chamber may reduce local side effects.<sup>3</sup></li> <li>• Advise patients to rinse and spit after use of inhaled corticosteroids.<sup>3</sup></li> <li>• Use the lowest ICS dose that provides control.<sup>3</sup> <ul style="list-style-type: none"> <li>• Before escalating the dose, ensure patients are adherent and are controlling triggers.<sup>3,8,9,17</sup> Assess technique.<sup>3,8,9,17</sup></li> <li>• Consider adding a LABA before increasing the ICS dose (CTS, GINA: preferred in patients 12 years and older).<sup>8,9,17</sup></li> </ul> </li> </ul>   |

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| Goal  | Suggested Strategies or Resources  |
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| Minimize adverse effects from asthma medications, continued                     | <ul style="list-style-type: none"> <li>• <b>Step-down</b> when asthma is well-controlled for at least 3 months (CTS: a few weeks), especially if lung function is normal, to minimize cost and side effects.<sup>3,8,9,15,17</sup> <ul style="list-style-type: none"> <li>• Avoid stepping down during pregnancy, travel, or respiratory infection.<sup>9,17</sup> Patients with risk factors for exacerbations (e.g., allergies or other triggers, a severe exacerbation in the past 12 months) may not be good candidates (see Box 2-2B, 2018 GINA guidelines, which pertains to patients six years and over. Box 6-4 pertains to younger kids).<sup>9</sup></li> <li>• Ensure the patient has a written action plan<sup>9,17</sup> (see below) and adequate meds to respond to worsening symptoms.<sup>9</sup></li> <li>• Use clinical judgment, and an approach that is basically the reverse of stepping up.<sup>3,9</sup></li> <li>• Consider reducing the ICS dose by 25% to 50% every two to three months.<sup>9,17</sup> (or as often as every three weeks in adults<sup>15</sup>). Box 3-9 in the GINA 2019 guidelines provides details on stepping down different controllers.<sup>17</sup></li> <li>• In adults and adolescents with confirmed asthma, the ICS should not be completely stopped unless you are reassessing the asthma diagnosis.<sup>17</sup> Reassess the asthma diagnosis (e.g., using spirometry) in adults who are successfully weaned from ICS.<sup>15</sup> About one third of adults diagnosed with asthma seem to either not have asthma or go into remission within five years.<sup>15</sup></li> <li>• If symptoms increase (e.g., rescue inhaler use or wheezing, chest tightness, shortness of breath, or cough more than twice weekly) or objective measurement of airflow obstruction worsens, resume the ICS at the lowest previously effective dose.<sup>9,15</sup></li> <li>• If the patient is on a LABA/ICS, the first step is to continue the LABA and reduce the ICS dose by using a lower-strength formulation.<sup>9</sup></li> <li>• Montelukast can be stopped without tapering.<sup>9,15</sup></li> <li>• For patients <math>\geq 6</math> years of age on a leukotriene receptor antagonist or low-dose ICS, consider stepping down to as needed low-dose ICS/formoterol or as needed low-dose ICS/inhaled SABA.<sup>17</sup></li> </ul> </li> <li>• Monitor growth in children using steroids.<sup>3,9</sup></li> <li>• Ensure ICS users are getting adequate vitamin D and calcium.<sup>3</sup></li> <li>• See our toolbox, <i>Corticosteroids: Selection, Tapering, and More</i>, for help tapering oral corticosteroids.</li> </ul> |
| Ensure patients understand how to use their inhaler.<br><br><i>Continued...</i> | <ul style="list-style-type: none"> <li>• Ensure patients understand the difference between reliever and controller medications.</li> <li>• For step-by-step instructions for using different types of inhalers, links to instructional videos, information on how to obtain demo inhalers, and guidance on priming and cleaning the devices, see our chart, <i>Correct Use of Inhalers</i> (U.S. Subscribers)(Canadian Subscribers). Detailed information for use and care of inhalers is found in their product labeling and patient information leaflet.</li> <li>• Give patients our patient education handout, <i>Tips for Correct Use of Inhalers</i>.</li> </ul>   |

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| Goal   | Suggested Strategies or Resources  |
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| Ensure patients understand how to use their inhaler, continued | <ul style="list-style-type: none"> <li>• Consider a spacer for patients using MDIs. Give patients our patient education handout, <i>Using a Spacer Device</i>.</li> <li>• Review inhaler technique at all visits,<sup>3,8,9,14</sup> including at the time of discharge from the hospital or emergency department.<sup>3,9</sup> In the U.S., the CPT code 94664 can be used to bill for teaching patients correct inhaler technique.</li> <li>• Become familiar with resources for inhaler teaching available at your practice site. To help educate your patients see the videos from VUCA Health, <i>Video Resources to Improve Patient Care</i>. (U.S.)</li> <li>• Pharmacists can get our technician tutorial, <i>Dispensing Inhaled Medications</i>, which covers ways technicians can assist the pharmacist in helping patients get the most out of their inhaled medications, such as by identifying patients getting frequent or early refills.</li> </ul>  |
| Help patients stay on their medications.                       | <ul style="list-style-type: none"> <li>• See our toolbox, <i>Medication Adherence Strategies</i>. Includes a guide to help patients find medications they can afford, including information about discount or patient assistance programs.</li> <li>• See our patient education handout, <i>Tips for Sticking With Your Meds</i>.</li> <li>• Teach patients to keep track of how many doses are left in their inhaler. Some inhalers have a dose counter. See our chart, <i>Correct Use of Inhalers</i> (U.S. Subscribers)(Canadian Subscribers).</li> <li>• Encourage patients to seek refills, if needed, in advance of weekends and holidays so they don't run out of medication.</li> </ul>  |
| Identify need for treatment modification.                      | <ul style="list-style-type: none"> <li>• In patients <math>\geq 6</math> years of age, <b>schedule a follow-up visit</b> one to three months after starting treatment, or per clinical need, then every three to 12 months.<sup>17</sup> (NHLBI: at least every six months; more often for patients with uncontrolled or severe asthma, or those with adherence issues).<sup>3</sup> CTS guidelines recommend follow-up every three to four months for preschoolers.<sup>13</sup> After an exacerbation, schedule a visit within two to seven days (one to two working days for children),<sup>17</sup> and again in one to two months for children <math>&lt; 5</math> years of age.<sup>9</sup></li> <li>• <b>At each visit, perform a physical exam</b><sup>3</sup> and ask about: <ul style="list-style-type: none"> <li>• asthma signs and symptoms (e.g., wheezing, cough, chest tightness, shortness of breath, nighttime symptoms).<sup>3,8</sup> <ul style="list-style-type: none"> <li>• Ask about symptoms over the past two to four weeks.<sup>3</sup></li> <li>• Ask whether control has been better or worse since the last visit.<sup>3</sup> <ul style="list-style-type: none"> <li>• If worse, ask the patient what they think caused the worsening, and what they did about it.<sup>3</sup></li> </ul> </li> </ul> </li> <li>• any environmental changes (e.g., new pets)<sup>3</sup> and trigger exposure.<sup>8</sup></li> <li>• frequency of use of short-acting bronchodilators.<sup>3</sup></li> <li>• interference of asthma with activities, work, school, and exercise.<sup>3</sup></li> <li>• asthma medication side effects.<sup>3</sup></li> <li>• adherence.<sup>3,8</sup></li> </ul> </li> <li>• See the GINA guidelines (<a href="http://ginasthma.org/">http://ginasthma.org/</a>) for concise checklists for assessment of asthma control in children five years and younger, and for older children and adults. Also see our algorithm, <i>Stepwise Treatment of Pediatric</i></li> </ul> |

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| Goal  | Suggested Strategies or Resources   |
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| Identify need for treatment modification, continued   | <p><i>Asthma</i>, for help assessing control.</p> <ul style="list-style-type: none"> <li>• <b>Validated instruments for asthma assessment</b> include the Asthma Control Questionnaire, Asthma Therapy Assessment Questionnaire (ATAQ), Asthma Control Test (ACT), and the Asthma Control Score. The ATAQ and Asthma Control Test are available at <a href="http://www.nhlbi.nih.gov/files/docs/guidelines/04_sec3_comp.pdf">http://www.nhlbi.nih.gov/files/docs/guidelines/04_sec3_comp.pdf</a>, along with a sample patient self-assessment form that patients can bring to follow-up visits.<sup>3</sup> To help implement the asthma guidelines in primary care practice, use the Asthma APGAR tools at <a href="http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3121335/pdf/jaa_3595_introduction_of_asthma_apgar.pdf">http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3121335/pdf/jaa_3595_introduction_of_asthma_apgar.pdf</a>.</li> <li>• <b>Reassess controller meds</b> if patients have asthma symptoms or need a rescue inhaler more than twice a week, or patients wake at night with symptoms twice a month.<sup>3,11,17</sup> (Canada: Asthma control criteria include &lt;4 doses of rescue inhaler per week, and nighttime symptoms less than once per week).<sup>8</sup> Assessing control in children five years of age and younger is problematic. The GINA guidelines (<a href="http://ginasthma.org/">http://ginasthma.org/</a>) provide some direction based on expert opinion. In preschoolers, an exacerbation requiring systemic corticosteroids or hospitalization should prompt reassessment.<sup>13</sup></li> <li>• <b>Perform spirometry</b> in the event of progressive or prolonged loss of asthma control, and at least every one to two years.<sup>3</sup> (Spirometry cannot usually be performed in preschoolers.<sup>13</sup>) FEV1 measured after three to six months of controller treatment can be used as the patient’s “personal best” for comparison.<sup>9,17</sup></li> <li>• <b>Assess adherence and inhaler technique</b> before stepping up therapy.<sup>3,8,17</sup> Check refill history when possible.<sup>3</sup></li> <li>• Consider PEF monitoring in patients with moderate or severe asthma,<sup>3</sup> those with poor symptom awareness,<sup>3,4</sup> and those with a history of severe exacerbations.<sup>3</sup> Keep PEF monitoring in perspective; it is not proven more useful than symptom monitoring.<sup>3</sup></li> <li>• Consider a “smart inhaler” (e.g., <i>Hailie</i>, <i>Propeller</i>, etc) with a sensor and mobile app to track the time, date, and location of inhaler use. Use the data to identify triggers, adherence problems, or need for therapy modification. See our chart, <i>Medication Adherence Apps</i>, for more information.</li> </ul> |
| Provide additional or alternative asthma medications when appropriate.<br><br><i>Continued...</i> | <ul style="list-style-type: none"> <li>• A <b>leukotriene receptor antagonist</b> (e.g., montelukast) can be considered as a(n): <ul style="list-style-type: none"> <li>• ICS (scheduled) alternative in mild persistent asthma (e.g., for patients who can’t/won’t use an ICS, patients who can’t tolerate an ICS, or patients with allergic rhinitis).<sup>3,8,9,17</sup></li> <li>• add-on to low dose ICS as an alternative to adding on a LABA or increasing the ICS dose (NHLBI: in patients 5 years and older; CTS: in adults).<sup>3,8,9,17</sup></li> </ul> </li> <li>• For patients who cannot tolerate short-acting beta-2 agonists, or LABAs, consider <b>ipratropium</b> or <b>tiotropium</b>, respectively.<sup>3,4,7</sup> Keep in mind that ipratropium has a slower onset than beta-2 agonists.<sup>9</sup> Tiotropium mist inhaler is an add-on option for patients ≥6 years of age with a history of exacerbations despite moderate- or high-dose ICS ±LABA.<sup>17</sup></li> <li>• <b>Cromolyn</b> (U.S.) is a non-preferred alternative to a low-dose ICS in mild asthma.<sup>3</sup></li> </ul>  |

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| Goal   | Suggested Strategies or Resources   |
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| Provide additional or alternative asthma medications when appropriate, continued | <ul style="list-style-type: none"> <li>• <b>Theophylline</b> is a non-preferred alternative to a low-dose ICS in mild asthma in patients 5 years of age and older.<sup>3</sup> (GINA: not for children &lt;12 years<sup>9</sup>). It can also be added to an ICS as an alternative to adding a LABA (except in NHLBI steps 5 and 6 in patients 12 and older), but requires serum concentration monitoring.<sup>3,9</sup> Canadian guidelines consider it a fourth-line agent, for adults.<sup>8</sup></li> <li>• Severe asthma may require long-term oral corticosteroids.<sup>3,8,17</sup></li> <li>• Consider adjunctive biologic (e.g., omalizumab [<i>Xolair</i>]) for qualifying patients with severe asthma.<sup>3,8,9,17</sup></li> <li>• If response to an alternative treatment is inadequate, try preferred treatment (if possible) before stepping up.<sup>3</sup></li> <li>• Also see our algorithm, <i>Stepwise Treatment of Pediatric Asthma</i>, for treatment options in children.</li> </ul>   |
| Know when to consult a specialist.   | <ul style="list-style-type: none"> <li>• <b>Canada:</b> patients who need oral corticosteroid courses frequently should be referred.<sup>8</sup> Also consider referral for patients 12 years of age and older who are uncontrolled despite an ICS plus LABA.<sup>8</sup></li> <li>• <b>U.S.:</b> consult specialist if patient requires a medium-dose ICS plus LABA.<sup>3</sup></li> <li>• <b>GINA:</b> refer patients ≥12 years of age who do not respond to GINA step 4 (e.g., medium-dose ICS plus LABA).<sup>17</sup></li> <li>• In general, refer children &lt;12 years of age who do not respond to a medium-dose ICS.<sup>8,9,17</sup> Also see our algorithm, <i>Stepwise Treatment of Pediatric Asthma</i>, for guidance on when to refer children.</li> </ul>   |
| Manage triggers.   | <ul style="list-style-type: none"> <li>• Identify triggers based on history, allergy testing,<sup>3</sup> and PEF monitoring.<sup>9</sup> <ul style="list-style-type: none"> <li>• Ask about reactions to aspirin, NSAIDs, sulfites,<sup>3,4</sup> and monosodium glutamate (MSG).<sup>4</sup></li> <li>• Ask patients whether exposure to cold air<sup>3,4,9,17</sup> or if changes in the weather cause symptoms.<sup>3,9</sup></li> <li>• Ask adults about work history, and whether symptoms are worse at work, to identify occupational sensitizers.<sup>17</sup></li> </ul> </li> <li>• Some triggers should be avoided (e.g., smoke, occupational sensitizers, NSAIDs, aspirin [consider desensitization], confirmed food allergy), but others should not be avoided due to other benefits (e.g., exercise). Some triggers are difficult to avoid, and benefits of avoidance may not be worth the expense or trouble.<sup>17</sup></li> <li>• Advise patients to avoid strong odors, and outdoor activity when pollution levels are high (although outdoor activity is usually OK if asthma is well-controlled).<sup>3,9</sup> Other common triggers are dust mites, animal dander, cockroach droppings, mold, and pollen.<sup>3</sup> Advise use of non-polluting heat sources, or vent them outdoors.<sup>9</sup></li> <li>• Avoid noncardioselective beta-blockers in asthma patients. Cardioselective agents may be tolerated.<sup>3</sup> Consider risk/benefit.<sup>9</sup> Initiate under medical supervision (even intra-ocular products).<sup>9</sup></li> <li>• Consider a short-acting beta-2 agonist, LABA, or cromolyn (U.S.) to use before exercise to prevent exercise-induced asthma.<sup>3</sup></li> <li>• Consider cromolyn use (U.S.) prior to allergen exposure.<sup>3</sup></li> </ul> |

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| Goal   | Suggested Strategies or Resources   |
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| Identify comorbidities that may complicate asthma care.  | <ul style="list-style-type: none"> <li>• Gastroesophageal reflux disease (GERD) is a risk factor for asthma exacerbations.<sup>17</sup> Treat symptomatic GERD.<sup>17</sup></li> <li>• Help patients lose weight.<sup>3,4,9</sup> Asthma is more difficult to control in obese patients.<sup>17</sup> Even weight loss of 5% to 10% can help.<sup>17</sup> Get our chart, <i>Drugs for Weight Loss</i>, and give your patients our patient education handout, <i>Tips for Getting to a Healthy Weight</i>.</li> <li>• Control rhinitis and sinusitis to reduce nasal symptoms.<sup>17</sup></li> <li>• Manage stress when it occurs.<sup>17</sup> Anxiety and depression are associated with worse symptoms and quality of life, and exacerbations.<sup>17</sup> Help patients distinguish between anxiety symptoms and asthma symptoms.<sup>17</sup></li> <li>• For pharmacotherapy options, see our charts, <i>Choosing and Switching Antidepressants</i>, <i>Combining and Augmenting Antidepressants</i>, and <i>Pharmacotherapy of Anxiety Disorders</i>.</li> </ul>  |
| Review the asthma guidelines.  | <ul style="list-style-type: none"> <li>• Get the NHLBI's <i>National Asthma Education and Prevention Program</i> at <a href="http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.pdf">http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.pdf</a>.</li> <li>• Canadian asthma guidelines are available from the Canadian Thoracic Society at <a href="https://cts-sct.ca/guideline-library/">https://cts-sct.ca/guideline-library/</a>.</li> <li>• The Global Initiative for Asthma Management and Prevention is available at <a href="http://www.ginasthma.org">http://www.ginasthma.org</a>.</li> </ul>   |
| Empower patients for <b>self-care</b> to prevent exacerbations (flare-ups) and hospital visits.<br><br><i>Continued...</i> | <ul style="list-style-type: none"> <li>• Teach patients to recognize symptom patterns that suggest loss of asthma control.<sup>3,4</sup></li> <li>• Develop an <b>asthma action plan</b> for the patient to help them recognize and manage worsening asthma.<sup>3,4,9,17</sup></li> <li>• Consider adding the colors of the inhalers when referring to them in the action plan, and/or putting red, yellow, and green stickers on the patient's medications to correspond to the red, yellow, and green areas of the action plan.</li> <li>• The NHLBI's <i>So You Have Asthma: A Guide for Patients and Their Families</i> (available at <a href="http://www.nhlbi.nih.gov/files/docs/public/lung/SoYouHaveAsthma_PRINT-reduced-filesize.pdf">http://www.nhlbi.nih.gov/files/docs/public/lung/SoYouHaveAsthma_PRINT-reduced-filesize.pdf</a>) contains a customizable action plan.</li> <li>• Another example of a customizable action plan is available at <a href="http://www.rampasthma.org/info-resources/asthma-action-plans">http://www.rampasthma.org/info-resources/asthma-action-plans</a>. Plans are available in English, Spanish, Chinese, and Vietnamese.</li> <li>• Patients should be instructed to contact their prescriber in the event of an exacerbation, even with an action plan.<sup>3</sup></li> <li>• For children 5 years and younger, educate parents that flare-up warning symptoms may include coughing, reduced activity, or poor eating, as well as the more obvious signs such as increased asthma symptoms or reduced response to reliever medication.<sup>9</sup> Urgent care is needed if the child is distressed, lethargic, or fails to respond to a short-acting beta-2 agonist (e.g., more than 6 puffs are needed within the first 2 hours, or has not recovered after 24 hours), especially if the child is less than 12 months of age.<sup>9</sup> Same-day medical help is needed if the child needs the inhaler more than three times per hour, or for more than 24 hours.<sup>3</sup></li> <li>• If PEF &lt;50% predicted/personal best patient should seek emergency help.<sup>3</sup></li> <li>• Other patients can follow an action plan starting with 2 to 6 puffs of a short-acting beta-2 agonist, repeated every 20 min. for one hour. If they do not experience rapid, sustained improvement, or symptoms worsen, they should seek</li> </ul> |

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| Empower patients for self-care to prevent exacerbations (flare-ups) and hospital visits, continued | <p>medical care. The short-acting beta-2 agonist can be continued every 3 to 4 hours for 24 to 48 hours.</p> <ul style="list-style-type: none"> <li>• In <b>children</b>, an oral corticosteroid can be started for persistent wheezing and PEF &lt;80% predicted or personal best.<sup>3</sup> See <b>footnote a</b> for dosing.</li> <li>• In <b>adults and adolescents</b>, the ICS dose can be quadrupled in addition to intensifying reliever use. If using an ICS-LABA combo, mind that the max daily LABA dose is not exceeded (e.g., formoterol 72 mcg).<sup>17</sup> This may necessitate use of a separate ICS-only inhaler.<sup>17</sup> If PEF is &lt;60% personal best or not improving after 48 hours, contact prescriber and add oral corticosteroid.<sup>17</sup> See <b>footnote a</b> for dosing.</li> </ul>   |
| Treat exacerbations (flare-ups) in the outpatient setting when appropriate.                        | <ul style="list-style-type: none"> <li>• Intensify short-acting beta-2 agonist (e.g., initially 4 to 10 MDI puffs [with spacer] for ages 6 years and older or 2 to 6 puffs for younger children, repeated every 20 min. for the first hour).<sup>9,17</sup> Give oxygen to maintain oxygen saturation 94% to 98% for children, or 93% to 95% for adults and adolescents.<sup>9,17</sup></li> <li>• Consider oral corticosteroid (e.g., for wheezing and dyspnea and/or PEF &lt;80% predicted/personal best despite initial treatment with short-acting beta-2 agonist).<sup>3</sup> <ul style="list-style-type: none"> <li>• <b>Adults:</b> prednisone or prednisolone 40 to 60 mg/day (NHLBI);<sup>3</sup> 30 to 50 mg/day (CPT);<sup>8</sup> or 40 to 50 mg/day [GINA]<sup>17</sup> for 5 to 7 days.<sup>17</sup> Preliminary evidence suggests that a single dose of oral dexamethasone 12 mg might work as well for mild to moderate exacerbations [Evidence level B-1].<sup>14</sup></li> <li>• <b>Children:</b> for dosing, see <b>footnote a</b>.</li> <li>• Consider one intramuscular dose or two daily oral doses of dexamethasone for children.<sup>10</sup></li> </ul> </li> </ul> |
| Triage patients for possible hospital admission.   | <ul style="list-style-type: none"> <li>• For children 5 years of age and younger, hospital transfer is recommended if there is no response to short-acting beta-2 agonist intensification within 1 to 2 hours, the child can't drink or speak or has retractions or cyanosis, if oxygen saturation is &lt;92% on room air, or comes from a resource-poor home.<sup>9</sup></li> <li>• Life-threatening exacerbations in patients ≥6 years of age include drowsiness, confusion, or "silent chest."<sup>17</sup> Other signs/symptoms indicating need for transfer to an acute care facility include speaking in words (not phrases), sitting hunched forward, respiratory rate &gt;30/min., use of accessory muscles to breathe, pulse &gt;120 beats per minute, oxygen saturation &lt;90% on room air, or PEF ≤50% predicted or personal best.<sup>17</sup></li> </ul>  |
| Treat exacerbations in the inpatient setting appropriately.<br><br><i>Continued...</i>             | <ul style="list-style-type: none"> <li>• Short-acting beta-2 agonists are the drugs of choice for acute exacerbations.<sup>3</sup> <ul style="list-style-type: none"> <li>• The minimum initial albuterol (salbutamol, Canada) dose is 2.5 mg (4 to 8 MDI puffs) every 20 to 30 minutes for three doses.<sup>3</sup></li> <li>• Addition of ipratropium 0.5 mg or 8 puffs (children: 0.25 to 0.5 mg or 4 to 8 puffs) in the ED for up to 3 hours reduces admission.<sup>3</sup></li> </ul> </li> <li>• <b>NHLBI:</b> give prednisone or methylprednisolone 40 to 80 mg/day in 1 or 2 divided doses (children: 1 to 2 mg/kg/day, max 60 mg until PEF is 70% predicted).<sup>3</sup> <b>GINA:</b> prednisone 50 mg in adults and 1 to 2 mg/kg/day in children, to a</li> </ul>   |

*More...*



| Goal  | Suggested Strategies or Resources  |
|---|--|
| Treat exacerbations in the inpatient setting appropriately, continued | <p>max of 20 mg for children &lt;2 years, 30 mg max for children two to five years, and 40 mg max for ages six years and older.<sup>9</sup> Continue for at least five to seven days in adults, three to five days in children.<sup>9</sup> Oral dexamethasone for two days is an alternative in children.<sup>9</sup></p> <ul style="list-style-type: none"> <li>• Start within one hour of presentation.<sup>9</sup></li> <li>• Consider establishing clinical pathways.<sup>3</sup></li> <li>• Oxygen should be administered to most patients.<sup>3</sup></li> <li>• Consider 2 g IV magnesium (children: 25 to 75 mg/kg, up to 2 g) over 20 min. in patients with a history of life-threatening exacerbations, patients with FEV1 &lt;40% at presentation, patients who still have severe symptoms after one hour of therapy in the ED, or children whose FEV1 does not reach 60% predicted after one hour of therapy.<sup>3,9</sup></li> <li>• Give antibiotics only to those patients who have pneumonia or bacterial sinusitis.<sup>3</sup></li> <li>• Methylxanthines (aminophylline, theophylline) are not beneficial and increase adverse events.<sup>3</sup></li> <li>• Don't use mucolytics (acetylcysteine, guaifenesin, etc). They can worsen asthma symptoms.<sup>3</sup></li> </ul> |
| Prevent avoidable hospital readmissions.                              | <ul style="list-style-type: none"> <li>• See our toolbox, <i>Reducing Hospital Readmissions</i>.</li> <li>• Ensure patient is finishing any remaining oral corticosteroid or antibiotic doses at home.</li> <li>• Ensure controller inhaler was started/restarted at discharge, and that patient understands it is for scheduled use.</li> <li>• Assess understanding of treatment regimen and inhaler use.</li> <li>• Ensure patient has an asthma action plan.</li> <li>• Ensure patient's chronic illnesses are tuned up.<sup>8,9</sup></li> <li>• Get resources from the Agency for Healthcare Research and Quality such as <i>Taking Care of Myself: A Guide for When I Leave the Hospital</i> at <a href="https://www.ahrq.gov/sites/default/files/publications/files/goinghomeguide.pdf">https://www.ahrq.gov/sites/default/files/publications/files/goinghomeguide.pdf</a>. This booklet is based on their Re-engineered Discharged (RED) Toolkit for helping hospitals improve the discharge process to prevent readmissions, available at <a href="https://www.ahrq.gov/professionals/systems/hospital/red/toolkit/index.html">https://www.ahrq.gov/professionals/systems/hospital/red/toolkit/index.html</a>.</li> </ul>  |

- a. Prednisone or Prednisolone dosing, **children:** 1 to 2 mg/kg/day (max 20 mg/day <2 years; 30 mg/day three to five years, or 40 mg/day ≥6 years of age; per CTS: max 50 mg/day<sup>8,13</sup>), usually for three to five days.<sup>9,17</sup> Prednisone or Prednisolone dosing, **adults:** 40 to 50 mg/day, usually for five to seven days (GINA).<sup>17</sup>

*Users of this resource are cautioned to use their own professional judgment and consult any other necessary or appropriate sources prior to making clinical judgments based on the content of this document. Our editors have researched the information with input from experts, government agencies, and national organizations. Information and internet links in this article were current as of the date of publication.*

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## Levels of Evidence

In accordance with our goal of providing Evidence-Based information, we are citing the **LEVEL OF EVIDENCE** for the clinical recommendations we publish.

| Level    | Definition  | Study Quality   |
|----------|---|---|
| <b>A</b> | Good-quality patient-oriented evidence.*  | <ol style="list-style-type: none"> <li>1. High-quality RCT</li> <li>2. SR/Meta-analysis of RCTs with consistent findings</li> <li>3. All-or-none study</li> </ol>   |
| <b>B</b> | Inconsistent or limited-quality patient-oriented evidence.*   | <ol style="list-style-type: none"> <li>1. Lower-quality RCT</li> <li>2. SR/Meta-analysis with low-quality clinical trials or of studies with inconsistent findings</li> <li>3. Cohort study</li> <li>4. Case control study</li> </ol> |
| <b>C</b> | Consensus; usual practice; expert opinion; disease-oriented evidence (e.g., physiologic or surrogate endpoints); case series for studies of diagnosis, treatment, prevention, or screening. |   |

\***Outcomes that matter to patients** (e.g., morbidity, mortality, symptom improvement, quality of life).

**RCT** = randomized controlled trial; **SR** = systematic review

[Adapted from Ebell MH, Siwek J, Weiss BD, et al. Strength of Recommendation Taxonomy (SORT): a patient-centered approach to grading evidence in the medical literature. *Am Fam Physician* 2004;69:548-56. <http://www.aafp.org/afp/2004/0201/p548.pdf>]

**Project Leader in preparation of this clinical resource (350702):** *Melanie Cupp, Pharm.D., BCPS*





## References

- Centers for Disease Control and Prevention (CDC). Influenza vaccination: a summary for clinicians. Page last reviewed September 7, 2016. <http://www.cdc.gov/flu/professionals/vaccination/vax-summary.htm>. (Accessed May 23, 2019).
- An Advisory Committee Statement (ACS). National Advisory Committee on Immunization (NACI). Canadian Immunization Guide chapter on influenza and statement on seasonal influenza vaccine for 2018-2019. May 2018. <https://www.canada.ca/content/dam/phac-aspc/documents/services/publications/healthy-living/canadian-immunization-guide-statement-seasonal-influenza-vaccine-2018-2019/canadian-immunization-guide-statement-seasonal-influenza-vaccine-2018-2019.pdf>. (Accessed May 23, 2019).
- National Institutes of Health. National Heart, Lung, and Blood Institute. Expert Panel Report 3 (EPR 3): Guidelines for the Diagnosis and Management of Asthma 2007. <https://www.nhlbi.nih.gov/files/docs/guidelines/asthgdln.pdf>. (Accessed May 24, 2019).
- Lougheed MD, Lemiere C, Dell SD, et al. Canadian Thoracic Society Asthma Management Continuum-2010 Consensus Summary for children six years of age and over, and adults. *Can Respir J* 2010;17:15-24.
- O'Byrne PM, FitzGerald JM, Bateman ED, et al. Inhaled combined budesonide-formoterol as needed in mild asthma. *N Engl J Med* 2018;378:1865-76.
- Global Initiative for Asthma. Difficult-to-treat & severe asthma in adolescent and adult patients. Diagnosis and management. A GINA pocket guide for health professionals. April 2019. <https://ginasthma.org/wp-content/uploads/2019/04/GINA-Severe-asthma-Pocket-Guide-v2.0-wms-1.pdf>. (Accessed May 27, 2019).
- Clinical Resource, *Tiotropium (Spiriva) for Asthma. Pharmacist's Letter/Prescriber's Letter*. December 2015.
- Lougheed MD, Lemiere C, Ducharme FM, et al. Canadian Thoracic Society 2012 guideline update: diagnosis and management of asthma in preschoolers, children, and adults. *Can Respir J* 2012;19:127-64.
- Global Initiative for Asthma. 2018 GINA report global strategy for asthma management and prevention. <https://ginasthma.org>. (Accessed May 23, 2019)
- Keeney GE, Gray MP, Morrison AK, et al. Dexamethasone for acute asthma exacerbations in children: a meta-analysis. *Pediatrics* 2014;133:493-9.
- Baylor Health Care System. Rules of two. [https://www.baylorhealth.com/SiteCollectionDocuments/Documents\\_Dallas/Art%20for%20Asthma/BMFL-CC-109\\_RuleOfTwo-11x17PST-v4.pdf](https://www.baylorhealth.com/SiteCollectionDocuments/Documents_Dallas/Art%20for%20Asthma/BMFL-CC-109_RuleOfTwo-11x17PST-v4.pdf). (Accessed June 17, 2019).
- Centers for Disease Control and Prevention (CDC). Pregnant women and influenza (flu). Page last reviewed February 12, 2019. <https://www.cdc.gov/flu/highrisk/pregnant.htm>. (Accessed May 23, 2019).
- Ducharme FM, Dell SD, Radhakrishnan D, et al. Diagnosis and management of asthma in preschoolers: a Canadian Thoracic Society and Canadian Paediatric Society position. *Can Respir J* 2015;22:135-43.
- Rehrer MW, Liu B, Rodriguez M, et al. A randomized controlled noninferiority trial of single dose of oral dexamethasone versus 5 days of oral prednisone in acute adult asthma. *Ann Emerg Med* 2016;68:608-13.
- Aaron SD, Vandemheen KL, FitzGerald JM, et al. Reevaluation of diagnosis in adults with physician-diagnosed asthma. *JAMA* 2017;317:269-79.
- Beasley R, Holliday M, Reddel HK, et al. Controlled trial of budesonide-formoterol as needed for mild asthma. *N Engl J Med* 2019;380:2020-30.

*More . . .*

17. Global Initiative for Asthma. Pocket guide for asthma management and prevention (for adults and children older than 5 years). Updated 2019. <https://ginasthma.org/wp-content/uploads/2019/04/GINA-2019-main-Pocket-Guide-wms.pdf>. (Accessed May 22, 2019).

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