New evidence-based tool to guide the creation of asthma action plans for adults

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Abstract

Objective To improve the use of asthma action plans (AAPs) among primary care physicians.

Sources of information In a 2017 article, recent asthma guidelines and adult studies (January 2010 to March 2016) addressing acute loss of asthma control were reviewed to develop an evidence-based tool to help guide physicians in creating AAPs to maximize adherence and minimize errors. Evidence supporting the effects of AAPs is level I. Evidence supporting the recommendations in the tool ranges from level I to consensus.

Main message A lack of knowledge about and training in creating appropriate AAP content is an important barrier to the use of AAPs, as is the fact that instructions provided by asthma guidelines are often difficult to integrate into real-world practice. In order to address these issues, a freely accessible, practical, evidence-based tool has recently been created, addressing both the knowledge and the practical barriers to AAP creation. This tool has been formatted as a printable bedside chart for the point of care, but could also be integrated into a computerized electronic decision support system in the future.

Conclusion Asthma action plans, in conjunction with asthma education and regular follow-up, can improve patients' symptoms and quality of life and reduce hospitalization. This novel point-of-care tool provides practical advice on how to complete AAPs to improve patients' asthma self-management.

Case description

Janette, a 35-year-old woman with objectively diagnosed asthma, presents to her family physician for a regularly scheduled follow-up visit. She is currently using a high-dose inhaled corticosteroid (ICS) and long-acting β-agonist (LABA) combination (fluticasone-salmeterol disk-inhaler, 250/50 µg, 1 puff twice daily) as controller therapy, with salbutamol as needed for rescue therapy. Despite good adherence to this therapy and adequately controlled day-to-day asthma symptoms, she has between 1 and 2 asthma exacerbations each year requiring emergency department visits. In addition to reviewing Janette's adherence and inhaler technique, and identifying and treating modifiable risk factors for exacerbations (such as avoidance of work- and home-related asthma triggers), the primary care physician wonders whether Janette would benefit from an individualized written action plan to hopefully allow earlier therapy adjustment and prevent such serious exacerbations. If so, how could she work with Janette to create one in an efficient and evidence-based manner?

Editor's key points

- Asthma action plans (AAPs) are personalized written plans created by health care professionals in collaboration with patients with asthma; they are designed to provide guidance for self-management of acutely worsening asthma.
- The effect of AAPs has been studied extensively across a range of contexts, and their use has been shown to reduce asthma hospitalization and to improve asthma symptoms and quality of life. Despite the body of evidence in favour of AAPs and consistently strong recommendations for their use in international asthma guidelines, very few patients actually receive written AAPs.
- The point-of-care tool described here aims both to address knowledge barriers and to increase the efficiency of developing AAPs in family practice.

Sources of information

Evidence base for asthma action plans (AAPs). Asthma action plans are personalized written plans created by health care professionals in collaboration with patients with asthma; they are designed to provide guidance for self-management of acutely worsening asthma (**Figure 1**). These plans use a "traffic light" configuration: a "green zone" describes acceptable control and lists baseline medications, a "yellow zone" details loss of control and instructions for transiently intensifying therapy, and a "red zone" indicates severe symptoms that require urgent medical attention.[1] The effect of AAPs has been studied extensively across a range of contexts. A 2003 Cochrane review of randomized controlled trials (RCTs) showed that the use of AAPs, when coupled with adequate education and regular clinical review, significantly reduced asthma hospitalizations (relative risk [RR] of 0.58, 95% CI 0.43 to 0.77), emergency department visits (RR=0.78, 95% CI 0.67 to 0.91), and nocturnal symptoms (RR=0.57, 95% CI 0.45 to 0.72), and improved quality of life (standard mean difference of 0.29, 95% CI 0.11 to 0.47) in adults (level I evidence).[2] Patients were recruited from various care settings, including outpatient general practice clinics and inpatient settings. A 2015 Cochrane review of RCTs and non-randomized controlled trials showed that in adult asthma patients, a chronic disease management program predominantly including structured follow-up, individualized asthma education, and AAP provision improved asthma-specific quality of life, asthma severity scores, and lung function tests (level I evidence).[3] Most included studies recruited patients from primary care clinics or pharmacies. A more recent meta-review of 27 systematic reviews and 13 additional RCTs found that supported self-management of asthma including an AAP reduced hospitalizations and unscheduled consultations, and improved quality of life (level I evidence).[4] This evidence was consistent across cultural, demographic, and health care settings. In keeping with this breadth of evidence, international asthma guidelines strongly recommend that all patients with asthma receive a written AAP.[5] The patient described above would particularly benefit from an AAP in combination with education and regular clinical review, given her history of exacerbations.

Limitations of the evidence for AAPs. It is imperative to emphasize that most studies demonstrating the benefits of AAPs consistently include 2 other intervention components: asthma education and regular follow-up.[2,3,6] A recently published Cochrane review of RCTs highlights the importance of this point, as AAPs alone or AAPs combined with education were not found to reduce emergency department visits or hospitalizations compared with no AAPs or education alone, respectively (level I evidence).[7] While the results of this review were based on a small number of studies, they underscore the importance of providing comprehensive asthma management including education and regular follow-up, rather than providing AAPs in isolation. Additionally, although asthma guidelines recommend that all patients with asthma receive written AAPs, the effectiveness of AAPs in elderly patients with multiple comorbidities has not been adequately assessed, and there is observational evidence that patients older than 60 years of age have difficulty with self-monitoring, which is required for effective use of AAPs (level II evidence).[8] Further, according to a Cochrane review of RCTs, patients from ethnic subgroups benefit most from culturally specific self-management materials rather than generic tools (level I evidence).[9] Finally, a systematic review found that inner-city populations with low health literacy require team-based approaches and cultural tailoring to achieve effective self-management (level I evidence).[10] These patients, and other patient groups with low health literacy levels, might also benefit from pictorial rather than text-based AAPs.[11] In our case, the family physician caring for Janette would need to consider these patient-specific factors. If proceeding with provision of an AAP, she must also ensure that asthma education is delivered along with the AAP and that close follow-up is maintained. The educational component should involve some degree of in-person counseling (provided by a physician or appropriately trained health care practitioner such as an asthma educator), but can also be effectively complemented with online resources.[12,13]

Main message

Despite the body of evidence in favour of AAPs and consistently strong recommendations for their use across international asthma guidelines, studies found that only 4% of family physicians reported consistently providing a written AAP and only 2% of patients actually received one.[14,15] Evidence suggests that inadequate training and knowledge regarding appropriate AAP content—particularly what therapy to recommend in the AAP's acute-loss-of-control (yellow) zone—represents an important barrier to AAP provision in family practice.[16-18] In fact, there is an adequate evidence base to guide best therapy in the AAP yellow zone. In RCTs, increasing the ICS dose by 4- to 5-fold for 7 to 14 days during acute loss of asthma control as part of an AAP yellow zone has been shown to reduce the need for oral corticosteroids, whereas only doubling the dose has been ineffective (level I evidence).[19] However, it is not always clear whether and how a 4- to 5-fold dose increase can be put into real-world practice. For example, dose augmentations in patients taking moderate or high ICS doses, or those taking combination ICS-LABAs, might often result in ICS or LABA doses that exceed regulatory limits. Furthermore, a 4- to 5-fold ICS dose increase can be achieved in various ways, including adjusting the *number,* the *frequency,* or *both* of inhalations of the baseline inhaler; temporarily *adding* a new ICS inhaler; or temporarily *changing* to a new inhaler. Unfortunately, guidance as to the optimal approach is lacking in existing asthma guidelines.[5] These practical implementation challenges pose an important barrier to effective AAP provision in primary care.

To address these gaps, a set of evidence-based principles for determining required doses and also for practically

Figure 1. Janette's asthma action plan

Name: Janette Doe

Date: Jan 16th, 2018

Review with your healthcare provider at every visit.

Asthma Action Plan

Emergency contact name: Mrs. Betty Smith Phone: 416-555-5555

Physician name: Dr. B. Lung Phone: 416-333-3333

Personal Best Peak Flow 440 L/min

The goal of asthma treatment is to live a healthy, active life.

Remember that it is very important to remain on your maintenance medication, even if you are having no symptoms of asthma.

Go: Maintain Therapy

Description *You have ALL of the following:*

Rarely need extra reliever

Almost no cough, wheezing, shortness of breath or chest tightening

Can do normal physical activities and sports without difficulty

No missed regular activities or school or work

Night asthma symptoms less than 1 night per week

Peak Flow: >80% personal best, or > 350

Other: n/a

Instructions:

Medication	Puffer colour	Dose	Puffs	Times per day
Controller				
Fluticasone/ Salmeterol	Purple	250/ 50µg	One	Twice daily
Reliever				
Salbutamol	Blue	100µg	One to two	Every 4-6 hours as needed

Other: Can take 1-2 puff of blue reliever inhaler before exercise as needed

Caution: Step Up Therapy

Description *You have ANY of the following:*

Use your reliever more than 3 times per week

Have daytime cough, wheezing, shortness of breath or chest tightening more than 3 days per week

Physical activity is limited

Asthma symptoms at night or in early AM 1 or more nights per week

Peak Flow: 60-80% personal best, or 260 to 350

Other: n/a

Instructions:

☐ Increase _____ (colour) controller to: ____ puffs ____ times per day for _____

☑ Add Orange Fluticasone Diskus 250µg (colour) controller three puffs two times per day for 7 days

☑ Take Blue (colour) reliever 1 to 2 puffs every 4 to 6 hours as needed

☑ If no improvement in your symptoms and/or peak flows in 2 days or your reliever only lasts for 2-3 hours, go to red zone

Other: Remember to keep taking your Purple controller inhaler one puff twice daily

Stop: Get Help Now

Description *You have ANY of the following:*

Reliever lasts 2-3 hours or less

Continuous asthma symptoms

Continuous cough

Wheezing all the time

Severe shortness of breath

Sudden and severe attack of asthma

Peak Flow: <60% personal best, or < 260

Other: n/a

Instructions:

Take Blue (colour) reliever 2-4 puffs every 10-30 minutes as needed

Asthma symptoms can get worse quickly. When in doubt, seek medical help.

Ashtma can be a life-threatening illness. Do not wait!

If you cannot contact your doctor: call 911 for an ambulance, or go directly to the Emergency Department!

Bring this asthma action plan with you to the emergency room or hospital

Stay calm

Other:

Allergies may be triggering your asthma - avoid the things that you are allergic to and have allergy skin testing if you are unsure.

Controller: has a lasting effect, treats inflammation, prevents asthma attacks, may take time to act
Reliever: rapidly relieves symptoms of cough, wheeze, lasts 4 hours

BREATHE the lung association

Adapted from Gupta S, et al. Respiration 2012;84(5):406-15.

"formulating" yellow-zone medications have recently been proposed.[5] (See tables 2 and 3 in Kouri et al[5] available at **erj.ersjournals.com/content/49/5/1602238#T2**). These principles were then applied to develop a practice tool in the form of a printable bedside chart listing each appropriate yellow-zone recommendation for various corresponding baseline (green zone) medication regimens (**erj.ersjournals.com/content/erj/49/5/1602238/DC1/embed/inline-supplementary-material-1.pdf?download=true**).[5] This tool also provides guidance on the appropriate use of oral corticosteroids in the context of an AAP in patients who fail to improve clinically with an increase in their controller medication and in those with a history of sudden and severe exacerbations, and it discusses the implications for AAPs of the use of budesonide-formoterol as maintenance and reliever therapy.[5]

Case resolution

Janette and her family physician discuss the idea of asthma self-management and decide that it would be a beneficial approach to avoiding asthma-related emergency department visits and to improving Janette's quality of life. They discuss the different elements of an AAP. For her yellow zone, after consulting the practical tools outlined above,[5] they choose to maintain the controller fluticasone-salmeterol disk-inhaler and to *add* a fluticasone disk-inhaler (250 µg), 3 puffs twice daily for 7 days, to achieve a total daily fluticasone dose of 2000 µg during periods of loss of asthma control (**Figure 1**). This represents a 4-fold increase in Janette's ICS dose without increasing her LABA dose, which was already at its allowable limit. The physician then provides brief asthma education, reviewing Janette's asthma control, medication adherence, and inhaler technique; discusses modifiable risk factors for poor control, such as smoke and allergen exposure; and provides Janette with a link to further self-directed online asthma educational resources (**Box 1**).[5] Follow-up in 6 months was then arranged to review Janette's asthma control.

Box 1. Helpful resources for patients and physicians

Evidence-based, printable asthma action plan for practice (see figure 3): **www.karger.com/Article/FullText/338112**

Online clinician educational program on creating asthma action plans: **machealth.ca/programs/asthma-action-plan**

Open-access link to "An evidence-based, point-of-care tool to guide completion of asthma action plans in practice"[5]: **erj.ersjournals.com/content/49/5/1602238**

Patient asthma education resource "Taking Control of Your Asthma" interactive learning module: **public.machealth.ca/programs/taking-control-of-your-asthma/default.asp**

Conclusion

This novel point-of-care tool aims to both address knowledge barriers and to increase the efficiency of developing AAPs in family practice. Other barriers, such as the time required to provide AAPs and asthma education, and the lack of availability of AAPs at the point of care, can be addressed in the future by integrating this knowledge into a computerized clinical decision support system, which can automate many of the required steps in AAP generation and delivery.[20] Patient-level barriers, such as adherence and inhaler technique, are equally important aspects of ensuring optimal asthma therapy[21] and should be integrated into future asthma self-management tools.

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Contributors
All authors contributed to the literature review and interpretation, to creating the tool, and to preparing the manuscript for submission.

Competing interests
None declared

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