



Guest Editorial

Is it time for asthma action plan apps?



In 1991, the National Heart, Lung, and Blood Institute published the first evidence-based guideline for the diagnosis and management of asthma.¹ This guideline recommends that patients with asthma should be taught self-management skills and be given an asthma action plan (AAP) so that early loss of control could be treated by the patient at home. In 1997, an updated guideline reinforced the model of green, yellow, and red zone intervention strategies to facilitate maintenance of asthma control.² In a Cochrane Review of self-management plans for asthma, children who have an AAP have a lower risk of an exacerbation requiring an acute care visit and reduced symptom days.³ In addition, symptom-based plans were more effective for reducing symptomatic days per week than plans based on peak flows. In a subsequent study, individualized written action plans based on personal best peak flows and recommending inhaled and oral corticosteroids for treatment of exacerbations were found consistently to improve asthma health outcomes.⁴ The specific interventions to recommend in an AAP also have been described.⁵ Unfortunately, it is estimated that up to 50% of children do not receive an AAP as recommended by the guidelines.⁶

Even when patients are given an AAP, they tend to forget that they have it when needed or they are unable to recall where it is or what it recommends. This has been addressed by a number of approaches, including telephonic reminder systems and more recently by use of computer apps. A recent study identified 209 commercially available mobile applications for asthma; however, the most were found to offer general teaching, information about air quality, medication and asthma control tracking (usually using the Asthma Control Test), and a social forum for people with asthma. What they do not provide is personalization of an action plan, including instructions for what to do when the asthma gets out of control.⁷ In addition, few studies provide evidence that use of particular apps improves asthma control.

A 2013 Cochrane Review of smartphone and tablet self-management apps for asthma found only 2 studies of poor quality that assessed the effectiveness, cost-effectiveness, and feasibility of using smartphone and tablet apps to facilitate the self-management of individuals with asthma.⁸ One study found that the use of a smartphone app for the delivery of an asthma self-management program had no statistically significant effect on asthma-related quality of life at 6 months or in asthma flares that required oral steroids. The other study found that the use of a smartphone app resulted in higher asthma-related quality-of-life scores at 3 months and reduced visits to the emergency department at 6-month follow-up. Another study by Morton et al⁹

found a decreased in the number of courses of oral steroids and hospitalizations but no improvement in quality of life.

In the current issue of the *Annals of Allergy* in an article by Perry et al,¹⁰ 34 adolescents were randomly assigned to use a smartphone-based AAP or a paper-based action plan (17 in each group) for 6 months. Of these adolescents, 82% finished the study with only 6 lost to follow-up (did not complete postsurvey or did not log use in the paper diary or app). Those who did use the app logged in a median 4.36 days per week, although there was a decrease in use during the 6 months. Only 1 participant logged in every week during the study. Interestingly, the participants in the paper AAP group completed the paper diary significantly more frequently than patients in the smartphone AAP group. In terms of outcomes, Asthma Control Test scores were the same before and after for both groups, although patients who started with uncontrolled asthma generally improved. Self-efficacy and satisfaction scores also did not differ significantly between the 2 groups.

This article does not mention why there was a decline in use over time. It is possible that most patients find AAPs to be useful only when they are experiencing an exacerbation and prefer to not log their status when they are doing well. This finding corresponds with the preference of patients to take medications intermittently and only when they experience symptoms.¹¹ When patients feel well, they do not feel a need to take medications or to use an app. In fact, for patients who choose to not take their medications, reminder apps would most likely be annoying.¹² This emphasizes the need for apps to be available when needed but not necessarily designed to be used all the time. When they are needed, it is important that they be easy to use and that the recommendations be readily available. In the current article, patients had to fill in their asthma control before they could be assigned to a zone and instructions given. Although this is obviously necessary, the process needs to be simple or patients will get frustrated and not use it.

The purpose of an AAP is to provide patients with recommendations for daily home management and what to do with worsening symptoms. Daily treatment can be augmented with reminders, but these reminders become annoying quickly and need to be customized to avoid alert fatigue. Currently, there are so many apps available that do the same thing; therefore, people tend to develop app fatigue. People are tired of downloading and trying new apps that function essentially the same. According to one study, “one quarter of all apps are used only once.”¹³ The most important component of an AAP is to help patients identify when their asthma control is decreasing so that they can take rapid action to prevent it from progressing to the red zone.

So how should we use technology to improved asthma outcomes, including quality of life and asthma control, as well as

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reduced costs? Access to real-time online self-management instructions is one solution to manage daily asthma and worsening signs of asthma. Other options are telephonic AAPs, app-based AAPs, and even text-based AAPs. Each of these helps to bridge the gap between a paper-based AAP that relies on patient memory for effectiveness and having real-time access to AAP instructions. Ultimately, asthma management is not a one-size-fits-all proposition. The type of plan should be tailored to the individual. The important thing is that an AAP be provided, that the patient understands how to use it, and that its effectiveness be monitored so that the results can be used to improve the process.

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References

- [1] National Heart Lung and Blood Institute. National Asthma Education Program. Expert panel report: guidelines for the diagnosis and management of asthma. *J Allergy Clin Immunol*. 1991;88:425–534.
- [2] National Heart, Lung, and Blood Institute, National Asthma Education Program. *Expert Panel Report 2: Guidelines for the Diagnosis and Management of Asthma (EPR-2 1997)*. Bethesda, MD: US Dept of Health and Human Services; National Institutes of Health; 1997. NIH publication 97-4051.
- [3] Bhogal S, Zemek R, Ducharme FM. Written action plans for asthma in children. *Cochrane Database Syst Rev*. 2006;3:CD005306.
- [4] Gibson PG, Powell H. Written action plans for asthma: an evidence-based review of the key components. *Thorax*. 2004;59:94–99.
- [5] Dinakar C, Oppenheimer J, Portnoy J, et al. Management of acute loss of asthma control in the yellow zone: a practice parameter. *Ann Allergy Asthma Immunol*. 2014;113:143–159.
- [6] Simon AE, Akinbami LJ. Asthma action plan receipt among children with asthma 2–17 years of age, United States, 2002–2013. *J Pediatr*. 2016;171:283–289.e1.
- [7] Wu AC, Carpenter JF, Himes BE. Mobile health applications for asthma. *J Allergy Clin Immunol Pract*. 2015;3:446–448.e1–16.
- [8] Marcano Belisario JS, Huckvale K, Greenfield G, Car J, Gunn LH. Smartphone and tablet self management apps for asthma. *Cochrane Database Syst Rev*. 2013;11:CD010013.
- [9] Morton RW, Elphick HE, Rigby AS, et al. STAAR: a randomised controlled trial of electronic adherence monitoring with reminder alarms and feedback to improve clinical outcomes for children with asthma [published online November 4, 2016]. *Thorax*. doi:10.1136/thoraxjnl-2015-208171.
- [10] Perry TT, Marshall A, Berlinski A, et al. Smartphone-based vs paper-based asthma action plans for adolescents. *Ann Allergy Asthma Immunol*. 2017;118:295–300.
- [11] Bender BG, Bender SE. Patient-identified barriers to asthma treatment adherence: responses to interviews, focus groups, and questionnaires. *Immunol Allergy Clin North Am*. 2005;25:107–130.
- [12] Graves MM, Adams CD, Bender JA, Simon S, Portnoy AJ. Volitional non-adherence in pediatric asthma: parental report of motivating factors. *Curr Allergy Asthma Rep*. 2007;7:427–432.
- [13] McCurdie T, Taneva S, Casselman M, et al. mHealth consumer apps: the case for user-centered design. *Biomed Instrum Technol*. 2012;(suppl):49–56.