An Innovative Technology Profile: Mobile Asthma Management Tools

Mobile asthma management tools include novel technologies that empower patients to better understand where and what triggers asthma attacks in order to better prevent and treat asthma complications. This information enables patients to work with their providers and, more broadly, to support public health initiatives in their communities. These tools include GPS attachments to inhalers which record when and where inhalers are used, mobile logging applications where patients can manually enter asthma data, and early warning software that can alert patients to potential asthma attacks based on environmental factors like allergens and pollutants.

A representative sample of these tools includes the SpiroScout attachment by Asthmapolis, the mobile application AsthmaMD and early warning software from Asthma Signals.

Use Case

- According to the CDC, nearly 25 million people in the U.S. have been diagnosed with asthma, which is approximately 8 percent of the population.¹
- Asthma is a chronic disease characterized by pervasive disparities:
  - Asthma is higher among multiracial (14.8%), Hispanic (14.2%) and non-Hispanic Blacks (9.5%), as compared to non-Hispanic Whites (7.8%).²
  - Disparities are also seen in age, gender and socioeconomic status: current asthma prevalence is higher among children (9.3%) than adults (7.3%); higher among females (8.6%) than males (6.9%); and higher among the poor (11.2%) than the near-poor (8.4%) and non-poor (7.0%).³
- According to the 2010 Behavioral Risk Factor Surveillance System (BRFSS), 5.9% of children (n=530,690) and 7.7% of adults (n=2,155,879) in California currently have asthma.⁴,⁵
- Mobile asthma management tools target those who suffer from asthma attacks, especially children, in order to help them avoid attack-inducing allergen areas and help them better control and treat their asthma symptoms.
- There are a variety of mobile asthma management tools currently represented in the marketplace, all of which have similar but slightly different approaches:
  - Inhalers with GPS Technology: Several tools affix GPS tracking technology and a wireless link to the internet to the bottom of inhalers to help pinpoint the exact location and cause of an asthma attack.⁶
  - Inhalers with Audiovisual Reminders: Other tools use audiovisual reminders on inhalers to help improve asthma management.⁷
  - Smartphone Apps: Various tools use a Smartphone app to allow users to quickly and easily log their asthma activity, their medications and causes of their asthma in a diary which can then be shared with their physicians.⁸

³ CDC. 2011.
⁵ BRFSS. 2010.
Web and Mobile Phone Interfaces: Other applications connect patients and providers to recommendations through web and mobile phone interfaces.9

Clinical Benefit
A few mobile asthma management tools have been shown to have a number of positive clinical outcomes, such as helping patients get their asthma symptoms under control, improving the effectiveness of inhaler therapy and decreasing flare-ups, which result in fewer hospitalizations and trips to the emergency department or physician’s office for uncontrolled asthma.

- A five-month study in 2010 focused on rural adults with asthma in 12 states and showed that many of them were able to get their symptoms under control after being given baseline data collected from a rescue inhaler with a GPS attachment (n=42).10,11
- Another study in 2009, looking at the same tool over a four-month period with a different population, showed that 75 percent of the patients improved their level of asthma control to some degree (n=40).12
- A 2007 study examined the effectiveness of audiovisual reminders in promoting adherence to inhaler therapy and demonstrated positive results, with 95.5% of patients who received reminders taking more than half of their prescribed medication compared to only 71.7% for patients not receiving reminders. (n=110).13
- Some asthma demonstration projects have shown that about 90 percent of attacks experienced by children with poor control of their asthma can be eliminated with appropriate information and action.14 Other mobile asthma management tools have shown promising anecdotal evidence regarding clinical outcomes, but published results were not available.
- One asthma management tool has tracked over 50,000 users and improved the health of some asthmatics, though a randomized trial has not been conducted.15

Financial Analysis
- Asthma is a significant cost to our society, as annual expenditures for health and lost productivity due to asthma are estimated at over $20 billion.16
- Return-on-investment (ROI) for asthma management programs suggests positive potential financial savings: one review found that $2.72 was saved for every dollar spent on asthma disease management programs.17
- Another six-month study looked at an asthma management program and found net cost savings of $202,991.00, or 37.4 percent, compared to baseline costs. (n=258). Participants in this study also

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12 Ibid.
13 Charles, Quinn and Weatherall. 2007.
14 Asthma Signals. 2011.

Getting to Value: Eleven Chronic Disease Technologies to Watch
reported an 85.8 percent reduction in emergency room visits, a 57.5 percent drop in unscheduled physician visits and a 54.5 percent drop in hospitalizations.\textsuperscript{18}

- Although studies have looked at asthma management programs and found cost savings as well as a positive ROI, there have been almost no studies done on the cost effectiveness of mobile asthma management programs.
- Widespread adoption is dependent on insurers paying for mobile asthma management programs; if they are not covered by insurance, it is unlikely that patients will purchase them out-of-pocket, especially safety-net populations.
- Mobile asthma management programs can help to reduce asthma attacks, which could reduce the overuse of emergency departments, prevent unnecessary hospital readmissions and decrease the number of hospital admissions due to preventable asthma complications.\textsuperscript{19}

### Barriers to Adoption

- **Ease of Use Issues:** Many of these technologies use smartphone applications, which could be confusing for the elderly or those not as technologically savvy.
- **Limited Data:** These programs are largely untested, especially regarding outcomes and possible ROI and cost savings of these technologies.
- **Privacy Concerns:** In the absence of clear guidelines, GPS-tracking and the transfer of medical information over the internet are likely to raise privacy concerns with patients.
- **Cost of Supporting Devices:** Smartphones can be cost-prohibitive to elderly, minority and low-income populations.
- **Reimbursement Issues:** Widespread adoption of this technology is highly dependent on the reimbursement model. If these programs are not covered by insurance, it is unlikely that patients will purchase them out-of-pocket, especially safety-net populations.

### Next Steps to Implementation

1. **Develop Strategies that Address the Challenges of Patient Involvement:** Many of these technologies may be burdensome for the user. For example, convincing patients to manually enter asthma data into a smartphone app multiple times a day as part of their daily routine might be a tough sell. In addition, GPS-tracking of patients, whether via an inhaler with Bluetooth technology or a smartphone app, might create privacy and security issues. As a result, strategies must be developed with the patient in mind in order to minimize disruption to the patient’s routine and ease concerns about privacy.

2. **Leverage Technologies for Public Health Interventions:** These programs have clear epidemiological value, as asthma data can now be collected over time. In turn, public health and academic communities should work in partnership to develop an approach to compile and interpret data for targeted public health interventions.

3. **Opportunity for the Safety-Net:** Asthma is a chronic disease characterized by pervasive disparities, particularly in regard to minority and socioeconomic status. Strategies for the successful adoption of these technologies should also incentivize community interventions that focus on the safety-net population and make the business case for bundled payment models in Medicaid.

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