Children's Hospital of Philadelphia
PolicyLab

Tailored Adherence Incentives for Childhood Asthma Medications (TAICAM): Using Incentives and Mobile Health to Improve Medication Adherence for Children with Asthma

Statement of Problem

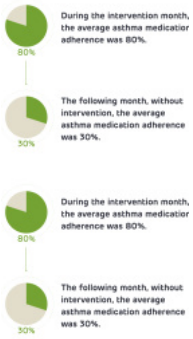
Urban racial/ethnic minority children are disproportionality impacted by asthma and are five times more likely to die of asthma compared to their non-minority peers. While many factors contribute to these disparities, non-adherence to asthma medications is one that is well-documented and where there is potential for improvement.

Inhaled corticosteroid (ICS) medications are highly effective in improving asthma control and reducing morbidity, and can reduce the number of days when children experience symptoms, emergency department (ED) visits and hospitalizations. Yet adherence is low among certain high-risk populations. *Compared to average medication adherence rates of around 50%, urban racial/ethnic minority children have average adherence rates between 11-37%.*

Technology-enhanced reminder systems have shown promising results for improving medication adherence in select populations. Few studies, however, have attempted to leverage mobile health technology and incentives to improve medication adherence in children with high-risk asthma. Broader challenges also exist in engaging both caregivers and children in asthma management and ensuring sustained behavior change when incentive programs conclude.

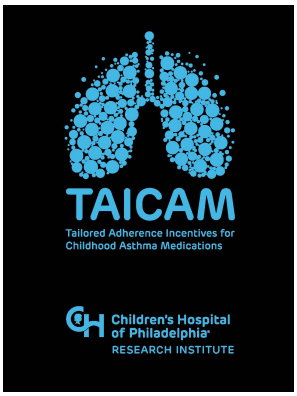
Description

Tailored Adherence Incentives for Childhood Asthma Medications



Medication adherence was near optimal in the intervention month, but dropped off when reminders and incentives stopped.

To better examine the potential of technology and incentives for families dealing with high-risk asthma, our team completed a **series** of **studies** to develop an intervention aimed at improving asthma medication adherence. After identifying important logistical considerations and design improvements for adapting such interventions to high-risk populations in two previous studies, the **latest pilot** incorporated gain-framed incentives for kids, which allows them to earn a reward for performing a particular behavior. In this case, we provided children with an incentive to take their asthma medication—they could earn up to $1/day for 30 days for perfect medication adherence. We also placed an electronic sensor on the child's asthma inhaler and downloaded a mobile app onto their caregiver's smartphone. The app provided daily medication reminders to the family and our study team sent weekly feedback on both the child's adherence and incentives accumulated.



Of the families we approached with the most severe asthma, we enrolled nearly 70% of children with 80% follow-up, demonstrating both robust family engagement and retention. Over the course of the intervention month, families received reminders, feedback and incentives. During this time, average medication adherence was 80%. However, in the following month when families did not receive any of this support, adherence dropped to 30%. These findings demonstrate the feasibility of this pilot incentive-based intervention in engaging caregivers and children with high-risk asthma in regular medication use, and indicate there is room for improvement in medication adherence.

In the next project phase, we will continue to apply behavioral economics principles to promote medication habits during a period of childhood when many behavior patterns are established. We will conduct a randomized control trial with children ages 5-12 who take daily ICS medication and who have had at least two asthma exacerbations in the preceding year (any combination of hospitalizations, ED visits or outpatient visits where oral steroids were administered). To test the intervention with a larger number of families, we have integrated the **Propeller Health** inhaler sensor platform with the **Way to Health** behavioral incentive research platform at the University of Pennsylvania to automate the calculation of incentives and adherence feedback to participants.

Building on the pilot study, this project aims to determine if this combination of technology and incentives works to enhance ICS adherence and decrease ED, hospital, and oral steroid use in high-risk children. Additionally, we will characterize groups of high-risk children with similar patterns of ICS adherence, identify potential ways to maintain or improve adherence, and assess the acceptability of the intervention among children and caregivers. During this next phase, we will also conduct health care provider interviews to identify provider- and care network-level facilitators and barriers to integrating an incentive-based mobile health intervention in the clinical setting.

Next Steps

This approach and subsequent results will add to the evidence base on how best to engage children with high-risk asthma and their families in their asthma care and understand the waning effects of financial incentives on asthma medication adherence.

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PolicyLab Leads

Chén Kenyon
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Faculty Member

Chén Kenyon is a pediatric hospitalist at Children's Hospital of Philadelphia (CHOP) and an Assistant Professor of Pediatrics at the University of Pennsylvania. He is also a faculty member at PolicyLab and Clinical Futures at CHOP and serves as the faculty lead for PolicyLab's Population Health Sciences Portfolio. Dr. Kenyon's research focuses on integrating care systems and reducing outcome disparities for children with asthma. His recent work focuses on developing novel interventions to enhance asthma controller medication use in the highest risk children by leveraging mobile health technology and incentives oriented to the child. He also co-leads the Asthma Population Health Workgroup at CHOP, implementing and evaluating network-wide interventions for children and families with different levels of asthma severity and risk.

Dr. Kenyon received his undergraduate degree from the University of Rochester in Mathematics and attended medical school at Boston University School of Medicine. He completed residency training in the Boston Combined Residency Program in Pediatrics, where he served as a chief resident. He then received a Masters in Health Policy Research as a Robert Wood Johnson Clinical Scholar at the University of Pennsylvania, which he finished in 2013.

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Team

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Faculty Member

Tyra Bryant-Stephens is a faculty member at PolicyLab at Children's Hospital of Philadelphia (CHOP), senior director of the Center for Health Equity at CHOP and the medical director of the Community Asthma Prevention Program (CAPP). Her research focuses on the use of community-based interventions to improve child asthma outcomes for underserved populations.

Dr. Bryant-Stephens founded CAPP in 1997. As medical director of the program, she leads a staff of 12 that includes registered nurse clinical and educational coordinators as well as lay home visitors. CAPP was designed to improve the health and well-being of children with asthma by providing free asthma classes in the community for parents and their children with asthma. The project also supported a new way of providing education in the homes of children with asthma where parents learned about the types of environmental changes that could be made to improve their child's asthma. In offering home visits and free asthma education, CAPP satisfied a strong need in the West Philadelphia community and received tremendously positive feedback from families and class participants.

In 2000 and 2001, CAPP's success in providing asthma education in the home and community was expanded when Dr. Bryant-Stephens received grants from the U.S. Environmental Protection Agency and the National Institutes of Health (NIH). Through the NIH-funded "Community Partnerships for Asthma Prevention" CAPP was able to continue to offer free home visits to the West Philadelphia community. Free asthma education classes continued to be offered through a grant from the Pew foundation.

Also in 2001, CAPP received a grant from the Centers for Disease Control and Prevention to expand its work into the North Philadelphia area. In this project, CAPP has worked with a collaborative of partners to implement four main interventions: community asthma education classes, home visits, primary care provider training and education for school's personnel. In 2005 CAPP also began to offer free asthma education classes to children in Philadelphia public and charter schools. In another new project, as part of the Merck Company Foundation's Merck Childhood Asthma Initiative, CAPP is expanding home visiting and community classes to areas of the city that were not previously served—neighborhoods in South, Northwest and Northeast Philadelphia.

Dr. Bryant-Stephens completed her MD at the Bowman Gray School of Medicine at Wakeforest University and her residency in pediatrics at the Medical College of Georgia.

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Related Tools & Publications

- Electronic Adherence Monitoring in a High-Utilizing Pediatric Asthma Cohort: A Feasibility Study
  Article
  Jun 2016
- Automated Adherence Reminders for High Risk Children With Asthma: A Research Protocol
  Article
  May 2017
- Controller Adherence Following Hospital Discharge in High Risk Children: A Pilot Randomized Trial of Text Message Reminders
  Article
  Feb 2018
- Perceived Access to Outpatient Care and Hospital Reutilization following Acute Respiratory Illnesses.
  Article
  Jul 2018
- Tailored Medication Adherence Incentives for High-risk Children with Asthma: A Pilot Study
  Article
  Aug 2019
- Tailored Medication Adherence Incentives Using mHealth for Children With High-risk Asthma (TAICAM): Protocol for a Randomized Controlled Trial
  Article
  Aug 2020
- Tailored Adherence Incentives for Childhood Asthma Medications: A Randomized Clinical Trial
  Article

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