Asthma Improvement Collaborative
The Asthma Improvement Collaborative (AIC) at Cincinnati Children’s Hospital aims to improve the health of children with asthma in Hamilton County, Ohio. In 2010, they set a five-year goal of reducing asthma-related hospital admissions and emergency department visits among Medicaid-enrolled children by 20 percent by 2015. They surpassed this goal in 2014, a year ahead of schedule. Since 2010, it has reduced the number of hospital admissions and emergency room visits for low-income children in the county by more than 25 percent.

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Mona Mansour, MD, the director of primary care and school health in the hospital’s Division of General and Community Pediatrics and the co-leader of AIC, and Robert Kahn, MD, the hospital’s associate chair of community health, attribute this progress to two features that distinguish AIC from most other asthma programs at hospitals. First, AIC focuses not only on improving the quality of medical care for children with asthma, but also on addressing the “social determinants” of their health. AIC recognizes that asthma conditions of these children are affected by a multitude of external factors, including the capacity of their families and schools to address their medical needs, the environmental conditions in their homes and communities, and their access to resources, such as medicine. Second, AIC has made quality improvement a core feature of its day-to-day work. It continually gathers data on its impact and uses the data on a regular basis to improve its results.

Cincinnati Children’s Hospital created AIC in 2008 to provide children with asthma a more comprehensive set of services to address both their immediate healthcare needs when they visit the hospital as well as the social determinants that affect their health when they return to their community. The program addresses these social determinants by educating families on how to manage their children’s asthma conditions and by partnering with community organizations.

One way AIC assesses risks and supports families in achieving optimal health for their children with asthma is by using the Child Asthma Risk Assessment Tool (CARAT). When a child with asthma is admitted to the hospital, a respiratory therapist uses a modified version of the CARAT to assess family knowledge and capacity to manage the child’s asthma and to identify the risk factors in the child’s home environment that may exacerbate her condition. The respiratory therapist then uses the results of the assessment to educate the child’s family on how to better manage the child's symptoms and address the risk factors.

AIC also educates families through its care coordinator and Home Health Asthma Pathway (HHAP) programs. The care coordinators are located in the hospital’s primary care clinics and work with the families of children with
sub-optimal asthma health to help them identify and overcome barriers to controlling their children’s asthma. For example, coordinators have found that some children have difficulty consistently using their asthma inhalers because they spend part of their week with one relative and the remainder with another. These children sometimes forget to pack their inhalers as they move between homes. In these cases, coordinators help the families access Medicaid benefits to pay for two inhalers so that they can keep one in each home.

The hospital also refers children with high-risk asthma conditions to the Home Health Asthma Pathway initiative if they are having trouble managing their asthma symptoms at home. HHAP sends nurses to the homes of these children to assess how their physical environments are affecting their symptoms, educate their families on how to manage their conditions better, and ensure that they have access to the medicine and equipment they need.

Recognizing that the hospital cannot address the social determinants of asthma alone, AIC has also partnered with a broad range of community organizations. For example, AIC has collaborated with:

- Local schools to ensure children receive the asthma medication they need during the school day;
- The local health department to connect families with programs that help them decrease dust, mold and other hazards in their homes that trigger asthma;
- Legal aid services to help families obtain Medicaid or stand up to landlords who refuse to remove mold and other hazards from their homes; and
- A pharmacy that has agreed to deliver asthma medication to families who have difficulty visiting pharmacies, such as parents who work long hours or who do not have a car.

In addition to collaborating with these partners on developing these services, AIC staff, including the care coordinators and home health nurses, connect individual children and families to the community partners who can best meet their needs.

This case study looks at the Asthma Improvement Collaborative through the lens of how the initiative uses and generates evidence in order to achieve its goals. Our analysis is organized around characteristics of a more inclusive approach to evidence that CSSP and the Friends of Evidence group have identified as frequently encountered in initiatives that can be considered “evidence innovators”. We examine each of these characteristics in turn.

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2 See Id.
AIC staff did not create their program from scratch. Instead, they relied on multiple sources of evidence, including research findings on the causes of asthma and research-based interventions. They also did not simply copy and paste the interventions they identified, but rather combined and adapted them to suit their context.

For example, as discussed above, AIC uses a modified version of the CARAT to identify risk factors for asthma among its patients and to educate their families on how to mitigate these risks. The CARAT is a widely used asthma risk assessment tool that is based on research from the NIH-sponsored National Cooperative Inner-City Asthma Study. Instead of administering the original CARAT assessment, AIC made several modifications to the tool to better serve patients. For instance, AIC added a question to the assessment on where children go to school. They collect this information so that they can contact the school nurses of children with poorly managed asthma symptoms and partner with them to treat the children’s conditions. Similarly, AIC added questions to the assessment to determine why particular patients have difficulty accessing asthma medication, such as a question on where patients live. Based on the responses to this question, AIC staff have been able to identify the children who live in multiple homes and who therefore need multiple sets of asthma medication.

As a further example, AIC staff also used and adapted research-based practices to develop the HHAP program drawing inspiration from home visiting programs in an entirely different context. They learned from programs such as the Nurse Family Partnership that send nurses, social workers, or other experts to the homes of low-income pregnant women and first-time mothers with young children to offer them guidance on pre-natal care and parenting. The positive impact of many of these programs has been well documented by researchers. Based on the research on these types of home visiting programs, AIC staff hypothesized that they could offer more effective guidance to caretakers on how to manage their children’s asthma conditions by sending nurses to visit and guide them in their homes.

In developing the HHAP program, AIC staff also learned from the Boston Children’s Hospital’s Community Asthma Initiative (CAI), which has achieved results by sending community health workers and nurse practitioners into the homes of families whose children have been frequently hospitalized for asthma. These workers identify asthma triggers in the homes, such as dust mites, and educate families on how to mitigate these triggers. Data from the program suggest that this program substantially reduces the number of asthma-related emergency department visits, hospitalizations and missed school days among children participating in the program.

AIC leaders attribute their progress in reducing asthma-related hospital admissions and emergency room visits among low income children to multiple factors, one of which was the improvement science processes they put in place across their initiative. Improvement science is a problem solving approach that involves “plan, do, study, act” cycles—that is, cycles of planning and implementing a solution to a problem, collecting and analyzing data on the results of the solution, and improving and scaling the solution based on those results.

Cincinnati Children’s Hospital convened three working groups on a monthly basis—an inpatient group, an outpatient group and a community group. A diverse set of AIC stakeholders, who offer different vantage points on AIC’s efforts, come together to analyze process and outcome data and develop plans for improvement at each of these meetings.

Mathematica conducted an external evaluation of AIC’s impact in 2012. Using Medicaid claims data from 2007 to 2010, they compared changes in hospital use among Medicaid-insured children with asthma in Hamilton County to similar children in three other Ohio counties. They found evidence of a greater reduction in the rate of emergency department visits among Hamilton County children with less severe asthma as compared to the reduction among similar children in the other counties. They did not find evidence of a greater reduction in the hospitalization rate of the Hamilton County Children. However, Mathematica only analyzed data from 2007 to 2010. Since 2010, AIC has continued to improve its program and it has further reduced the emergency department and hospitalization rates among children in its community. If researchers were to redo the Mathematica study with new data from recent years, they might reach different conclusions.
For example:

- AIC’s leaders, quality improvement consultant and asthma care coordinators attend the monthly meetings of all three of the working groups.
- Inpatient nurses, respiratory therapists, home health nurses, social workers, a chief resident, and health care providers including doctors from the hospital’s primary care pediatrics, pulmonary, and allergy divisions attend the inpatient meeting.
- Outpatient nurses and health care provider including doctors from its primary care division and outpatient Asthma Center attend the outpatient meeting.
- A variety of partners attend the community meeting, such as the Cincinnati Health Department’s Director of School and Adolescent Health and the Department’s School Nursing Program Supervisor.

The hospital also hosts a quarterly AIC steering committee meeting comprised of AIC’s leaders and representatives from its partner community groups. The steering committee sets the high-level goals of the AIC initiative while the working groups engage in more detailed discussions about how to achieve them.

At the monthly and quarterly meetings, the hospital’s data analysts and AIC program managers provide the meeting participants a progress report. The report typically includes data on the increase or decrease in the numbers and rates of hospital admissions and emergency department visits over the past month as well as data and run charts demonstrating how these numbers and additional process measures have fluctuated over the past several months and years. The report also summarizes the activities and challenges of the inpatient, outpatient and community working groups. At the meetings, the participants review the data and run charts in the reports, discuss the internal and external factors that may have contributed to the results, and decide on the next steps they will take to sustain or improve their impact.

For example, the AIC inpatient team implemented a process to ensure that when a patient with asthma was discharged from the hospital that they had all the medications needed to manage their asthma for the next 30 days in hand when they went home. This process was implemented because previous data indicated many families were unable to obtain medications when only provided prescriptions at discharge. The team noted that re-admissions and return emergency department visits to the hospital decreased when this process was implemented but noted that patients who were discharged on weekends were more likely to be re-admitted or return to the emergency department. The process had initially been implemented Mondays through Fridays as the Outpatient Pharmacy was not open on weekends. This data was used to support opening the Outpatient Pharmacy on weekends leading to further reduction in the re-admission/emergency department visit rate.

In addition to hosting AIC improvement science meetings at the hospital, Cincinnati Children’s Hospital has also trained one of AIC’s key partners—Cincinnati Health Department school nurses in the Cincinnati school district—on how to conduct their own improvement science processes. Three years ago, they trained nurses at a local school on how to use improvement science to achieve a specific goal: ensuring that students with asthma receive an asthma control test, which indicates whether students’ asthma conditions are well managed. The nurses used this test to assess and respond to the needs of individual children with asthma and to identify the highest risk children so that they could devote more of their time and resources to helping them. After achieving positive results in this first school, the hospital worked with the Cincinnati Department of Health and school district to spread the effort to eight schools the following school year and then to 47 of the 53 schools in the district this past school year.

In August 2014, the hospital offered a training boot camp on this initiative for school nurses across the district. The nurses set a goal of ensuring that 80 percent of the 4,400 children with asthma in the school district receive an asthma control test by the end of the school year. At the boot camp, the participants learned and practiced improvement science processes, such as mapping out the steps they would take to achieve their goal and the measures they would use to assess their progress throughout the year. By the end of the school year, the nurses had increased the percentage of students with asthma who received a control test from 64 percent to 76 percent, just four percentage points shy of their original goal.

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Building an Infrastructure, Practices and Culture to Support the Use of Evidence

Cincinnati Children’s Hospital has built a strong infrastructure to promote quality improvement across its departments and programs. AIC is one of several community health initiatives at the hospital that relies on this infrastructure to support its quality improvement efforts. This infrastructure consists of several core elements, including:

- **Staff**: The hospital has hired a team of quality improvement consultants housed within the James M. Anderson Center for Health Systems Excellence. Many of these consultants have experience working on improvement processes in the private sector at companies such as Toyota and General Electric. The hospital also now has hired a demographer and two data analysts who collect and analyze information on the results of the hospital’s programs, map the hot spots in the community with the greatest health risks and assess improvement over time. This team of consultants, demographers and data analysts split their time among several quality improvement efforts at the hospital with approximately 4 FTE working on community health challenges.

- **Training**: The hospital has trained many of its leaders and frontline staff in improvement science. Many business managers, physicians and nurses at the hospital have received formal improvement science training or have participated in an improvement science effort led by a colleague who has received such training. The hospital has also trained some of its partner organizations in improvement science, such as the schools discussed in the prior section.

- **Routines**: The hospital has established routines to help its staff systematically incorporate quality improvement into their work. For example, one such routine, as discussed above, involves monthly AIC meetings where different subsets of AIC staff get together to analyze the results of their work and develop plans for improvement.

- **Culture**: The hospital has developed a culture of improvement. Its senior leaders, including Michael Fisher, the CEO, and Uma Kotagal, the Senior Vice President for Quality and Transformation, have helped build this culture by regularly communicating to staff the value they place on sharing data and learning from both success and failure in order to improve.

While the programmatic and quality improvement infrastructure necessary to support community health initiatives like AIC requires an investment of dedicated resources, such investments have a two-fold return. First, it is entirely consistent with the hospital’s vision of being the leader in improving child health, not just improving child health care. Furthermore, pursuing this work has helped prepare the hospital for the current shifts toward value based care.

Conclusion

AIC has made substantial progress in achieving better outcomes for the young asthma sufferers in its community, advance its mission and reduce health care costs through a series of steps and institutional investments. First, AIC developed its initial set of interventions by drawing on a wide body of research on the causes of childhood asthma and the interventions that decrease asthma symptoms. Second, it applied this research to design a comprehensive approach it suit its unique context. Third, has continues to measure and improving its results and by collaborating with families, schools and communities as equal partners in combatting childhood asthma. Finally, the work is supported by dedicated expertise and a culture that values continued learning and improvement.
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