

Development of School-Based Asthma Management Programs in Rochester, New York: Presented in Honor of Dr Robert Haggerty

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ABSTRACT

In the spirit of Dr. Haggerty's teachings, we present an overview of our work to improve care for children with asthma in the context of 3 lessons learned: 1) the importance of providing integrated services across disciplinary boundaries for children with chronic illness, 2) the need to move from a care model focused only on the individual child to a model focused on the child, family, and community, and 3) the need to expand beyond the local community and take a broad perspective on improving health on a national level. The goal of our program is to develop sustainable models to overcome the multiple obstacles to effective preventive care for urban children with asthma. The primary intervention for our original School-Based Asthma Therapy program was directly observed administration of preventive asthma medications in school (with dose adjustments on the basis of National Heart, Lung, and Blood Institute guidelines). We found that children who received preventive medications in school through directly observed therapy had improved outcomes across mul-

iple outcome measures. Our subsequent asthma programs have focused on dissemination and sustainability, with the incorporation of communication technology to enhance the system of care. We are currently testing the 'School-Based Telemedicine Enhanced Asthma Management' program, including 400 children with persistent asthma from the Rochester City School District. This program includes directly observed administration of preventive asthma medication at school, and school-based telemedicine to assure appropriate evaluation, preventive medication prescription, and follow-up care. It is designed to implement and sustain guideline-based asthma care through existing community infrastructure, and could serve as a model for the integration of services in rural as well as urban communities.

KEYWORDS: asthma; chronic illness; prevention; telemedicine

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ASTHMA IS ONE of the most common chronic diseases of childhood, affecting 1 in 11 children in the United States.¹ Children of minority racial or ethnic backgrounds and children living in poverty suffer a disproportionate burden from the disease,² with prevalence rates higher than 13% among Puerto Rican and non-Hispanic black children.³ Asthma accounts for numerous office and emergency room visits and hospitalizations as well as substantial health care cost.⁴ Importantly, the burden of asthma extends beyond morbidity from ongoing symptoms and exacerbations. Asthma is also the leading cause of missed school days in children⁵ and contributes to limitations in activity,⁶⁻⁸ missed work days for caregivers,⁹ and caregiver stress and depression.¹⁰⁻¹²

National guidelines for the management of asthma recommend effective daily preventive anti-inflammatory medications for all children with persistent asthma symptoms.¹³ Implementation of these guidelines, however, has

been problematic. Many children in the United States with persistent asthma symptoms do not receive effective preventive medications.¹⁴⁻¹⁶ In one multistate study, more than one-third of children with persistent asthma symptoms reported no use of preventive medication.¹⁷ In addition, even among children who are prescribed a preventive medication, many do not achieve optimal control.¹⁷ Consistent with other studies that have shown adherence rates to preventive medications of approximately 50%, we have found that adherence to daily medications is very low¹⁸ and appropriate follow-up occurs infrequently.¹⁹ Further, parents tend to underestimate the child's overall disease severity²⁰ causing communication barriers with providers and inadequate attention to asthma care.¹⁸ Importantly, poor children living in the inner city are at greatest risk for underuse of preventive medications and lack of appropriate asthma care.^{21,22} Thus a significant amount of asthma morbidity could be prevented by improvements in the delivery of care.

ROCHESTER SCHOOL-BASED ASTHMA STUDIES

School-based programs represent a promising strategy for asthma management because of the potential to reach large numbers of children in a community setting, where they regularly spend much of their day.²³ Over more than a decade, we have had the privilege of working in partnership with the entire Rochester city school district in Rochester, New York to implement novel programs for urban, high-risk children with asthma. The Rochester city school district serves approximately 17,000 elementary school students, most of whom identify as either African American (57%) or Hispanic (28%). More than 80% of the students live in poverty, and approximately 1 in 6 students have asthma.

Our initial studies tested directly observed administration of preventive asthma medications in school to improve outcomes for children with persistent asthma.^{24,25} By delivering daily preventive medications through schools, adherence can be assured on the days the child attends school, and most schools are already equipped to provide daily medications for other conditions such as attention deficit disorder. Thus the delivery of daily preventive asthma medications at school represents a conceptually simple and inexpensive system intervention to improve adherence. In one study including 530 children (ages 3–10 years) from more than 50 elementary schools,^{23,24} results showed reduced morbidity, absenteeism, and exacerbations for children receiving directly observed therapy. We also found that the program was cost-effective in reducing asthma symptoms compared with other existing programs, with a cost of \$10 per symptom-free day.⁹

Although caregivers, providers, and the school health team (nurses and health aides) have been very supportive of this work, several aspects of the original SBAT program limit its sustainability and potential for dissemination. In particular, in SBAT all initial and follow-up assessment data were obtained by the study team through in-home and telephone contacts with families, and recommendations for initial medications as well as adjustments in therapy were communicated to the child's primary care provider (PCP). The PCP was asked to approve recommendations for preventive therapy so that they could be implemented by the study team. This made the initiation and tailoring of therapy burdensome because of difficulty communicating back and forth to primary care offices and lack of direct contact between the PCP and caregiver, and often resulted in delays in medication administration. With this key limitation in mind, we developed the SB-TEAM program as a new model of care within the school system, using telemedicine assessments to facilitate these steps in a potentially cost-effective and easily disseminable manner.

SB-TEAM STUDY

THEORETICAL FRAMEWORK

Our school-based interventions are based on the Chronic Care Model.²⁶ This model is currently being implemented

in a number of health care systems as an organizing framework for collaborative quality improvement efforts that involve changes to the system of care for chronic disease. The goal of the model is to ensure access to services that are proven to improve outcomes.

The Chronic Care Model components built into the SB-TEAM intervention include delivery system change (guideline-based preventive asthma medications delivered through school), decision support (telemedicine assessments with feedback to the PCP and family about the child's symptoms and implementation of guideline-based care), and community resources (school-based care, pharmacy support). These components allow for coordination of care among parents, schools, and providers. Objectives are to improve communication, access to care, adherence to medications, and satisfaction with care. Ultimate goals are to improve clinical and functional outcomes and reduce costs. Importantly, in all of our school-based programs, the medical home remains unchanged and the PCP is informed of every step of the child's asthma care.

TELEMEDICINE INTERVENTION

Telemedicine is a system that allows clinicians to provide assessment and consultation through remote audiovisual technology and enables children to be seen by a physician without making a trip to the doctor's office or hospital.^{27,28} This rapidly expanding technology eliminates a significant barrier to care by making it possible for a health care visit to be accomplished while the child remains at school, the parent remains at work, and the provider remains at their usual work place (or home). Telemedicine can be used to care for a large proportion of acute illness episodes that arise in children (eg, rashes, sore throats, colds, ear pain, pinkeye)²⁹ as well as to monitor and address chronic conditions such as attention deficit disorder and asthma.³⁰ Telemedicine is used in cities worldwide³⁰ and has been used in Rochester, New York for more than 10 years,³¹ now serving all schools in the city school district with mobile telemedicine units and having performed >14,000 visits. Additionally, there is reimbursement for telemedicine visits by local payers, making it a sustainable system of care. Telemedicine is an efficient, cost-effective, and safe way of reaching patients and facilitating access to care.^{29,32,33}

To overcome barriers to guideline-based preventive asthma care among minority, poor children residing in urban Rochester, New York, the SB-TEAM program uses: 1) school-based directly observed therapy with preventive asthma medications, and 2) telemedicine visits to overcome key barriers to guideline-based preventive asthma care.

INITIAL TELEMEDICINE ASSESSMENT

Children enrolled in the SB-TEAM group are scheduled for a telemedicine visit in the school health office at the start of the school year to provide an initial assessment and to determine the initial medication to be used for directly observed therapy. Most children receive once daily dosing of their preventive medication because it is effective³⁴ and allows for administration of medication during

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