Background:

- High proportion of low-income families
- 30-40% families below poverty line
- High proportion of minorities (most > 50% African-American)
- Rural healthcare access
- Existing interventions aimed at high-risk populations living in densely populated inner-city environments

Population density 7000 people/mile²
Population density 50 people/mile²

Major Gaps in Asthma Care

- Travel and cost constraints for rural, low-income residents
- Travel, cost and time constraints associated with community programs in rural areas
  - 50 persons/square mile (compared to large MSA >7000 persons/square mile)
  - Cost for one roundtrip to Delta ~$75 - $100

Major Gaps in Asthma Care in a High Risk Rural Population

- Asthma prevalence and morbidity is comparable to or higher than national trends
- Current healthcare delivery is inadequate
  - Inadequate medication prescribing and/or filling patterns
  - Medically isolated (poor or no access to subspecialty care)
  - High utilization of emergency health care services
- Exposure to risk factors is high
  - Aeroallergens; ETS

Telemedicine

- Delivery of remote clinical or educational services using technology.
- Telemedicine includes a variety of applications and services using two-way video, wireless tools and other forms of telecommunications technology.
Bridging the Rural Healthcare Gap with Telemedicine

- **Solutions**
  - Alternatives to improve healthcare delivery
  - Telemedicine
    - Efficient
    - Educate and empower
      - Patients, families, school nurses
    - Eliminates physical barriers
    - Eliminates travel costs for families

School-Based Telemedicine Education for Rural Children with Asthma

- **Specific Aims:**
  - Determine feasibility of implementing an interactive, school-based telemedicine education program in a high risk rural population
  - Explore the impact of asthma education via telemedicine on asthma knowledge, self-efficacy, and quality of life of caregivers and patients

<table>
<thead>
<tr>
<th>Demographic</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median Age</td>
<td>11.42 yrs</td>
</tr>
<tr>
<td>African-American Race</td>
<td>84.2%</td>
</tr>
<tr>
<td>Household income &lt;$14,999/yr</td>
<td>57.1%</td>
</tr>
<tr>
<td>Less than HS education</td>
<td>23.7%</td>
</tr>
<tr>
<td>Public Insurance (Medicaid)</td>
<td>73.7%</td>
</tr>
<tr>
<td>Smokers in Primary Household</td>
<td>23.7%</td>
</tr>
</tbody>
</table>

Results

<table>
<thead>
<tr>
<th>Asthma Severity Classification*</th>
<th>N**</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intermittent</td>
<td>3</td>
<td>15%</td>
</tr>
<tr>
<td>Mild persistent</td>
<td>4</td>
<td>20%</td>
</tr>
<tr>
<td>Moderate persistent</td>
<td>11</td>
<td>55%</td>
</tr>
<tr>
<td>Severe persistent</td>
<td>2</td>
<td>10%</td>
</tr>
</tbody>
</table>

*A based on NIH guidelines

**Data missing for some participants.

Telemedicine: Asthma Education Pilot

Results

<table>
<thead>
<tr>
<th>Asthma Control Classification</th>
<th>N*</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well controlled</td>
<td>3</td>
<td>15%</td>
</tr>
<tr>
<td>Not well controlled</td>
<td>10</td>
<td>50%</td>
</tr>
<tr>
<td>Very poorly controlled</td>
<td>7</td>
<td>35%</td>
</tr>
</tbody>
</table>

*Data missing for some participants.
## Pilot Conclusions and Lessons Learned

**Telemedicine Pilot**
- Significant change in caregiver self-efficacy scores, specifically in the area of attack prevention in the intervention group
  - No change in caregiver knowledge, child self-efficacy, or symptoms scores
- Larger effect may have been seen with a large and/or more diverse population
- Children were fairly uncontrolled at baseline so more intense intervention needed
  - Prompt the provider to initiate or step up preventive medications

## Building a School-Based Telemedicine Program

**Healthcare System**
- Pediatric/Respiratory/Educators
- Local Physicians
- Hospitals
- Local Pharmacy
- Area Health Education Coordinators
- Community Hospitals/Health Departments
- School Nurses

**Educator System Support**
- Department of Education
- School Boards
- Superintendents
- School Nurses
- Principals
- Teachers and Support Staff
- Parent Facilitators

**Technology Support**
- Arkansas Department of Information Services
- State Education Councils for Distance Learning
- School Information Technology Specialists

**Community Stakeholders**
- Nonprofit organizations
- Transportation Services
- Community Colleges
- Community Volunteers

## Component 1: Asthma Education

**Children (7-18 years)**
- Asthma Basics
  - What is Asthma?
  - Symptoms recognition
- Asthma Triggers
- Asthma Medications
  - Rescue vs. Controllers
- Asthma Action plans
- Devices
  - Inhalar, twisthalers, spacers, peak flow meters

**Parents**
- Asthma Medications
  - When and why
- Asthma Triggers
- Asthma Action plans
- Communicating with Healthcare providers

**School Nurses**
- Asthma Action plans
- Communicating with asthma providers and parents
- Asthma emergencies in school

## School-Based Telemedicine Education for Rural Children with Asthma

**Specific Aim 1:**
- Determine impact of an interactive, school-based telemedicine education program in a high risk rural population
- Examine impact on asthma symptoms, lung function, healthcare utilization, school absenteeism, and prescription filling patterns

**Specific Aim 2:**
- Examine impact on asthma knowledge, self-efficacy, and quality of life of caregivers and patients

## Other Intervention Components

**Component 2: Telemonitoring**
- Baseline and 3 months
- Asthma symptom profile past 2 weeks
- Lung function testing at school

**Component 3: PCP Prompt**
- Baseline and 3 months
- Child symptoms profile per parental report
- NHLBI classification
  - Based on symptoms and medication requirements
- Recommended therapy for level of severity and control per NHLBI guidelines
  - Copy to parent/guardian
Summary of Study Flow

Baseline assessment (n=540 parent-child dyads plus school nurses at intervention schools)

- Multifaceted Intervention (n=270)
  - Screening
  - Educational sessions
  - In-school pharmacy
  - Telemedicine
  - Parent outreach

- Usual Care (n=270)
  - Multifaceted care
  - In-school pharmacy
  - Outpatient physician

Primary Outcome: Change in symptom-free days, measured at the end of the intervention period (3 months) compared to baseline.

Secondary Outcomes: Asthma care utilization, medication use, caregiver knowledge, self-efficacy, and quality of life. All outcomes measured at 3 and 6 months post-intervention.

School Based Telemedicine Enhanced Asthma Management (SB-TEAM)

Principal Investigator: Dr. Jill Halterman, University of Rochester Medical Center
Co-Investigator: Dr. Tamara Perry, UAMS

Funding provided by National Institutes of Health
R01 Grant HL079954
Principal Investigator: Dr. Halterman, MD, MPH

SB-TEAM: The Basics

1. Directly observed therapy
2. Web-based screening and communication
3. Telemedicine for tailoring of care

SB-TEAM Study: Design

- Randomized Controlled Trial
- Enroll 400 subjects over 4 school years
- Treatment Group= School-Based Telemedicine Enhanced Asthma Management for 1 school year
- Control Group= Enhanced Usual Care
  - Asthma screening and notification of symptoms and participation to PCP
  - Systematic feedback to parents and providers to promote appropriate follow-up care

SB-TEAM Details: Telemedicine Assessment

- Certified Telemedicine Assistant (CTA) meets child at school and prepares visit for provider
- Telemedicine provider completes visit within 2 days and prescribes controller medication based on guidelines
- Prescription for controller medication sent to pharmacy for delivery to home and school
- Visit report sent to child’s PCP (for chart documentation)
- Visit report sent to child’s caregiver

SB-TEAM Details: Directly Observed Therapy

- Medications delivered to child’s school and home
- Child begins directly observed therapy of inhaled corticosteroid
SB-TEAM Details:

**Telemedicine Follow-up 1**

- 4-6 weeks after initial assessment, and 4-6 weeks after that, a follow-up visit is scheduled
- Certified Telemedicine Assistant (CTA) meets child at school and prepares visit for provider
- Telemedicine provider completes visit within 1-2 days and prescribes step-up in therapy as needed
- If step-up needed, new prescription sent to pharmacy for delivery
- Visit report sent to child’s PCP
- Visit report sent to child’s caregiver

SB-TEAM Study:

**Outcomes Assessment**

- Baseline and randomization at home visit
- Telephone follow-up surveys at 2, 4, 6 months post baseline
- Final follow-up home visit at end of school year
- **Primary Outcome:** Symptom-Free Days during Peak Winter Season

Conclusions

- Telemedicine provides an alternative to asthma healthcare delivery in high risk settings
  - Rural
  - Urban
- Can be utilized to deliver both educational and clinical services
  - Subspecialty consultations
  - Parent/child education
  - Healthcare visits
  - Home or school monitoring
- Eliminates distance and transportation barriers
- School and community-based programs can reduce school absenteeism and missed work for parents