

Research

Participation in Multidisciplinary Team Clinic Results in Improved Outcomes in Inner City Asthmatic Children

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CONFLICTS OF INTEREST
THERE ARE NO CONFLICTS OF INTEREST FOR ANY OF THE AUTHORS.

ABSTRACT:

Background: Detroit has an unusually large population of high-risk asthmatic children with increased morbidity and mortality from asthma.

Objective: To determine efficacy of a multidisciplinary team clinic for improvement of asthma care in high risk inner-city asthmatic children.

Methods: After an initial survey a multidisciplinary team (MDT) clinic was formed in an attempt to improve outcomes for high risk children with asthma in Detroit. The children were followed prospectively for one year after a one year retrospective chart review.

Results: A survey revealed that half of all children hospitalized for asthma who missed appointments for follow-up were not locatable within six months of the hospitalization. 126 families enrolled in the high risk clinic, and half completed six months of the study. There was significant decrease in the number of hospitalizations, ER visits and steroid bursts through MDT participation. There was significant improvement in the asthma knowledge questionnaire, except in regard to differentiation of controller versus rescue medication, i.e. despite one on one education sessions the families continued to identify beta-2-agonists as the medication that should be used daily to avoid attacks of asthma. Participation in the clinic program improved quality of life (QOL) scores for the children as their symptoms improved, but the same increase in QOL score was not seen for caregivers as their children's symptoms improved.

Conclusions: Although the transiency of the population was a challenge to follow-up care, MDT clinic participation was associated with significant improvement in asthma outcomes.

INTRODUCTION

Data from the Michigan Department of Community Health (MDCH) reveals that 21.7% of high school children in Detroit, Michigan have been diagnosed with asthma at some point in their lives.⁽¹⁾ Asthma hospitalization rates are three times higher in Detroit than the state of Michigan as a whole and there is a clear racial disparity; the rate of asthma hospitalizations among white persons in Detroit being 27.0 per 10,000, while the rate among black persons is 56.9 per 10,000, consistent with reported higher prevalence and severity of asthma in African Americans.^(1,2) The prevalence of persistent asthma is 10% higher in Detroit compared to overall prevalence in Michigan and reliance on the emergency department for asthma care is about 50% higher for Detroit children compared to the rest of the state.⁽¹⁾ Only 40% of Detroit children covered

by Medicaid with persistent asthma had an outpatient asthma specialist evaluation for asthma in 2004.⁽¹⁾ Perhaps the most compelling statistic of all is that rates of asthma death for Detroit children are 5.4 times higher than rates of asthma death for Michigan children as a whole, highlighting the extreme vulnerability that our patients have to poor outcomes from their asthma.^(1,2)

While our allergy division at the Children's Hospital of Michigan has run the inpatient service for asthma and has had asthma and allergy clinics for more than 20 years, the high morbidity and mortality clearly warrant further intervention for high risk children. Less than half of the hospitalized children keep an outpatient appointment for their asthma management.⁽³⁾ Particularly alarming is the mortality of children with asthma. We recently

reported a 10 year retrospective chart review of pediatric patients who died from asthma in our hospital. ⁽⁴⁾ A total of 14 children died from asthma in this time period and only 3 of those children had ever received care by a specialist and 11 never were followed in an asthma clinic or by a specialist despite prior hospitalizations for asthma. There was one death each year among our clinic population for the three years prior to starting this multidisciplinary team clinic for high risk asthmatic children ⁽⁴⁾.

We describe the results (successes and limitations) of a multi-disciplinary team clinic with adherence interventions and social service prevention outreach for high-risk asthmatic children in Detroit.

METHODS

A survey was conducted to establish needs of the high risk pediatric asthma population followed by a retrospective chart analysis and finally a prospective pilot study of pediatric asthma patients which was conducted at the Pediatric Asthma Clinic at Children's Hospital of Michigan. All of the children for the MDTC were recruited from our Pediatric Asthma Clinic or from the inpatient asthma service at Children's Hospital of Michigan over a three year period and were followed for one year of data collection. The entire study was conducted from 2005-2010. Patients were 5 to 18 years of age and were diagnosed with asthma by our pediatric allergists, and were considered high risk by one or more of the following criteria in the last year: A hospitalization for asthma, 2 emergency room visits, 4 oral steroid bursts, or 10 or more missed school days because of asthma. A history of ICU admission for asthma at any time in the child's life made him/her eligible for study entry. Children with other chronic lung conditions in addition to asthma such as broncho pulmonary dysplasia, tracheomalacia, or bronchiectasis were excluded. Children with known vocal cord dysfunction were also excluded.

Study Design: The initial survey was conducted by phone with families who failed to keep appointments for children with asthma after a hospitalization to determine reasons for non-adherence. During the clinic program data were retrospectively collected for each patient one year prior to the study (control) and prospectively for one year after enrollment (study). The study protocol was reviewed and approved by the Institutional Review Board. Informed consent was obtained from each participant's parent or legal guardian.

The study team consisted of pediatric allergists, a pediatric asthma nurse educator, a respiratory therapist, a clinical pharmacist, a clinical

pediatric psychologist, a social worker, and a liaison from Wayne County Social Service Medical Fragile Unit, a specialized unit established to assist with prevention of child neglect in chronically ill children in high risk home situations.

Data Collection:

Data were collected retrospectively for one year before the study and prospectively at six months and one year after enrollment. All surveys were collected face to face to avoid literacy issues. Data collected included demographics, medical history, social history including school information, allergies, skin prick test data, medical knowledge questionnaires for parent and child, Juniper quality of life survey for patient and parent (with permission), Life Event Scale (measure of life stressors), and Asthma management scores. ^(5,6) IQ testing was performed for the first 20 patients and caregivers enrolled, and then discontinued due to complaints of excessive time from caregivers. Comprehensive visits were reviewed routinely with the entire multidisciplinary team clinic, including the liaison from the Medical Fragile Unit. Amendments to the treatment plan and suggestions for improving adherence in the family (including assistance from community agencies) were composed and incorporated into the overall treatment plan. At follow-up visits the plans recommended by the team were presented to the patient and parent.

Statistical Analysis: Population demographics and baseline data were summarized using means and standard deviations where the data were approximately normally distributed. Paired *t* tests were used to compare means before and after intervention. Comparisons of categorical variables were performed using Chi-Square or Fisher's Exact test and comparisons for continuous variable were performed using analysis of variance (ANOVA). For all statistical tests, a *p*-value of less than 0.05 was considered statistically significant. Two-sided tests of hypothesis were used. All statistical analyses were performed using Statistical Package for Social Sciences (SPSS Inc.) version 11.0.

RESULTS

Prior to the clinic intervention, 166 families were phoned to participate in a survey to establish reasons for missed appointments at the Children's Hospital Asthma clinic following their children's hospitalization for asthma. Sixty seven (40%) responded to our survey questions. Of the 99 who did not take the survey, half (55) of the phone numbers were erroneous (already disconnected or wrong number given) and 38 families did not

respond after two attempts (left messages). Only 5 refused the survey outright. Of those who answered the survey 62/67 (93%) felt that it was clear what date and time their children's appointments were scheduled. Missing work or school was a concern for 29/67 (43%), while 25/67 (37%) stated lack of transportation as a major factor. No family reported that they did not believe that their child would benefit from seeing a specialist, and all gave suggestions about what would make it easier for them to come to the appointments in the future. All felt that help was needed to get their children into care and to keep them in care.

One hundred and twenty-six children were enrolled in the High Risk multi-disciplinary team clinic over a three year period and 60% of those were enrolled from the inpatient service (hospitalized for asthma), but all had been seen at least once in an asthma clinic at our institution prior to starting the program. Twenty four children dropped out of the study due to inability/unwillingness to keep visits or to complete surveys. Three children were removed because of exclusion criteria diagnoses made post-enrollment as a result of the initial medical evaluation. Thirty two children were lost to follow-up due to known relocation or disconnected phones.

Ninety-five percent of the children were African American, 4% Hispanic, and 1% Arabic. At entry 32% of the children received social security disability benefits for their asthma, 63% were enrolled in Children's Special Healthcare Services (state supplemented insurance for children with special health care needs that removes many barriers to health care) although all were eligible and were enrolled during the study. (Figure 1) of the 126 children enrolled in the study, 67 completed 6 months and 54 completed one year. At six months the total number of hospitalizations/ER visits for the group of 67 patients was 18 compared to 50 pre-enrollment ($p < 0.001$). Steroid bursts for the same group was 38 compared to 67 pre-enrollment ($p < 0.006$). At 12 months, hospitalizations/ER visits for the group of 54 was 20 versus 81 pre-enrollment ($p < 0.001$), and steroid bursts was 46 versus 97 pre-enrollment ($p < 0.001$). (Figure 2) No difference was detected pre-enrollment versus 6 or 12 month post enrollment for FEV1 or for FEV1/FVC.

Neither caregiver IQ nor patient IQ correlated with score on asthma knowledge questionnaire at entry and this parameter was dropped due to excessive time requirement. The most frequently missed item on the asthma knowledge questionnaire at entry was identification of daily (controller) versus rescue medication. These medications were frequently "confused" and misused. There was no significant difference in missed questions at 6 months post-entry, i.e. even

after asthma education and correction of the questions missed at entry, with only slight, non-significant improvement at 12 months. The other questions all showed significant improvement with educational sessions (average at entry 3/10 vs 6 month 9/1 ($p < 0.001$).

Figure 1: Demographics

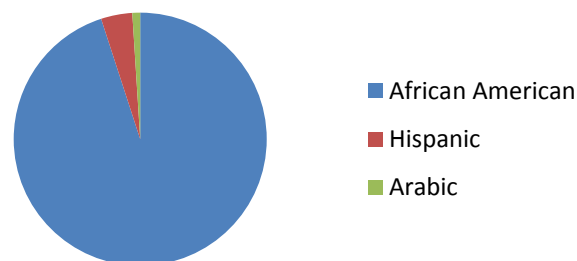


Figure 2a: Outcomes of Study – 6 months post enrollment

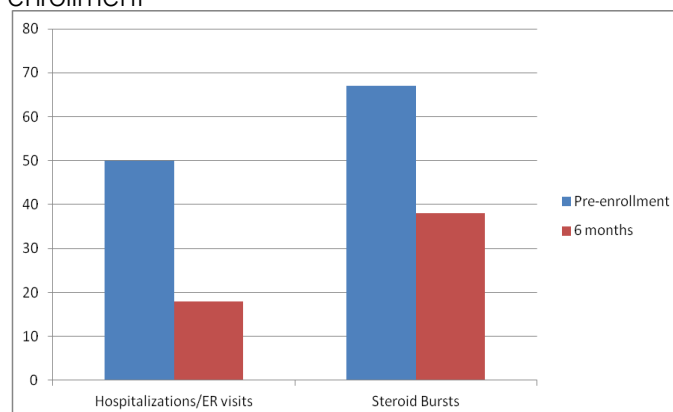
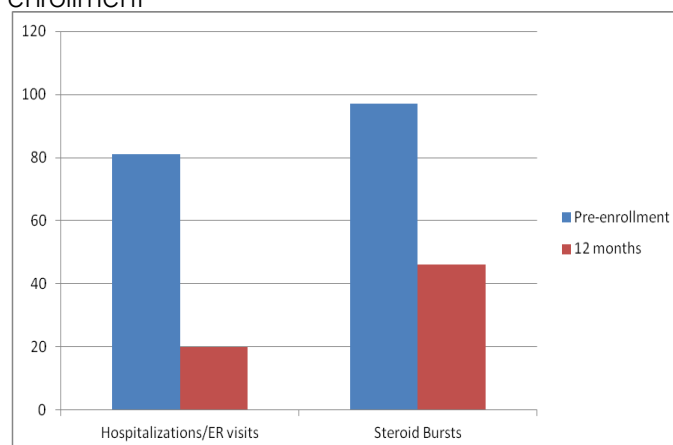


Figure 2b: Outcomes of Study – 12 months post enrollment



At study entry the Life Event score, a measure of family stressors, correlated with number of steroid bursts over the past two years, i.e. having more attacks that required oral steroids, correlated

positively with family stressors. The child's quality of life scores correlated positively with the caregiver's asthma management scores. The child's quality of life scores did increase significantly ($p=0.03$) from baseline to six months post-enrollment. The child's asthma self management efficacy score improved significantly from baseline to 12 months post-enrollment ($p<0.0001$), and the child's asthma responsibility score (responsibility for own asthma care) increased significantly at 6 ($p=0.029$) and at 12 months ($p=0.01$). The caregiver's QOL score, in contrast to the child's score, did not increase as the child's symptoms decreased.

In the 3 years prior to study there was one death yearly, or 3 total, from our pediatric clinic population. Two of the deaths were in children who had chronic non-adherence to medication and multiple hospitalizations, and one was in a child who died at an after school program who could not gain access to medication. During the program no deaths occurred in the clinic population. Unfortunately the liaison from the medical fragile unit was discontinued due to budget cuts and subsequently, we have had two deaths of children in our clinic program.

DISCUSSION

Our study demonstrated decreased hospitalizations, ER visits, and steroid bursts for children after enrollment in the MDT clinic. There was an increase in asthma related knowledge except regarding controller versus quick relief medication. Quality of life scores for children increased as their symptoms improved and as their asthma management scores improved, but there was no increase in demonstrated in quality of life for caregivers whose workload to keep the child healthy may have increased. Deaths from asthma in our clinic population decreased during the study.

The MDTC program was designed to improve services available to high risk children with moderate to severe asthma in Detroit by identifying barriers to adherence with medical regimens and finding workable solutions for families. It differed significantly from the traditional medical clinic in approach. The liaison from the medical fragile unit extended the reach of services to the community level, e.g. several of our families received in home services to assist with family counseling, housing, etc. The transiency of many of our families is an unresolved issue, as is the lack of transportation. Only half of the families who initially enrolled in the study were able to complete six months, and less than a third completed a year. We have a small group (18) who were available at 2 years for re-evaluation and the data still showed a trend of improvement over their pre-enrollment

hospitalizations and ER visits (15 post versus 49 visits in the 2 years pre-enrollment). Steroid bursts showed the same trend (37 post versus 55 pre-enrollment). The intervention clearly helps those who remain in care.

Another glaring issue is the misidentification of controller versus rescue medication, which appears to be more than a lack of education or information. Despite repeated education sessions (inpatient and outpatient) the caregivers frequently identified beta-2-agonists as the medication that prevents attacks and that should be given daily. This apparently reflects the caregivers habits and beliefs which are possibly based on the quick relief they observe. ^(7,8,9)

The transient nature of the families in our care remains an issue and the lack of transportation another unresolved issue. Additionally, this study addressed only those children who were already in the outpatient system, including those using this system sparingly. Many of our hospitalized asthmatics never see a specialist for outpatient care. ^(1,2)

We have, to date, been able to continue the services outlined for the MDT clinic, except the liaison from the medical fragile unit, through alternate funding. The demonstration of a need for in home interventions sparked a project for multi-systemic therapy for high risk asthmatics which demonstrated efficacy in the pilot. ⁽¹⁰⁾

Transportation remains a major problem for our families, and likewise the additional work of caring for a child during asymptomatic or non-emergency times remains a challenge for many families already overburdened.

QOL data at first seems contradictory, but consider that only 53% of the enrolled population were able to complete six months of study, despite the increased services available. Our families have many stressors other than asthma that impact quality of life. Transportation and monetary challenges such as missed work, may negate any positive effects of the child's improved asthma control. Perhaps, however, the burden of monitoring the medication administration and attending follow-up visits for sick children has a negative effect only in the short-term. Our hope is that the child's improved QOL may lead to improvement in the parents' QOL in long-term care as reported in other studies.

The challenge of keeping high-risk children on medication has increased since this study ended. Currently we estimate that less than half of our high risk children are regularly receiving medication recommended by NHBLI guidelines because of insurance restrictions on formulary and prior authorization.⁽¹¹⁾ While it is clear that an MDT

clinic is successful in decreasing morbidity and mortality for high-risk asthmatic children many barriers remain to giving optimal care to these fragile children.

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