

University of Massachusetts Amherst
ScholarWorks@UMass Amherst

Doctor of Nursing Practice (DNP) Projects

College of Nursing

2015

Asthma Education and Care Coordination in the Medical Home

Veronica G. Mansfield

Follow this and additional works at: https://scholarworks.umass.edu/nursing_dnp_capstone

 Part of the [Community Health and Preventive Medicine Commons](#), and the [Nursing Commons](#)

Mansfield, Veronica G., "Asthma Education and Care Coordination in the Medical Home" (2015). *Doctor of Nursing Practice (DNP) Projects*. 54.

Retrieved from https://scholarworks.umass.edu/nursing_dnp_capstone/54

This Open Access is brought to you for free and open access by the College of Nursing at ScholarWorks@UMass Amherst. It has been accepted for inclusion in Doctor of Nursing Practice (DNP) Projects by an authorized administrator of ScholarWorks@UMass Amherst. For more information, please contact scholarworks@library.umass.edu.

Asthma Education and Care Coordination in the Patient-Centered Medical Home

Veronica Mansfield, DNP(c), APRN, PPCNP-BC

Submitted to the Graduate School

of the University of Massachusetts Amherst

in partial fulfillment of the requirements for the degree of

DOCTOR OF NURSING PRACTICE

May 2015

Approved as to style and content by:

College of Nursing Committee Chair: Dr. Karen Kalmakis

College of Nursing Committee Member: Dr. Edith Dundon

Outside Member: Mary Blankson

Abstract

Asthma is the most common chronic disease in childhood. In spite of the many advances in the medical management of asthma, families frequently seek treatment for acute exacerbations of asthma in the emergency department. The purpose of this project was to evaluate asthma care provided to pediatric patients at a community health center in New England through scheduled nursing visits for asthma education and care coordination. The asthma education and care coordination program was developed based on both the NHLBI, NAEPP, Expert Panel 3, 2007 guidelines and ANA White Paper and Agency for Health Care Quality (AHRQ) value of nursing care coordination. The evaluation phase of the Ottawa Model for Research Utilization Model using data gathered from patients, practitioners, and systems was used to assess the effectiveness of the intervention. Results of this evaluation reveal that although all of the nurses received education and training at each of twelve clinic sites the results from the three sites identify that the nurses were not providing the asthma education and care coordination visits. Recommendations include further education, training, and a change in clinic nurse role to fully implement the program.

CONTENTS

Abstract2

Asthma Education and Care Coordination in the Patient Centered Medical Home5

 Significance of the Problem6

Review of the Literature10

 Patient Education.....11

 Provider Education13

 Asthma Education Performed by Non-healthcare Workers14

 Preventative Management15

 Specialty/Primary Care.....16

 Discussion.....17

Theoretical Framework18

Project Description, Implementation, and Monitoring20

 Study Description20

 Community Assessment20

 Organizational Analysis of CHC21

 Evidence of Stakeholder Support22

 Resources, Facilitators and Challenges22

Project Design.....25

 The project specific goal and objectives:26

 Costs and Budget27

 IRB Approval and Protection of Human Subjects28

Evaluation29

 Data Analysis.....29

Results.....31

Demographic31

Evaluation of the Asthma Education and Care Coordination Program.....31

Discussion33

Conclusion35

References.....36

Appendix A.....43

Appendix B.....44

Asthma Education and Care Coordination in the Patient Centered Medical Home

According to the Center for Disease Control more than 25 million Americans currently suffer from asthma. In the United States 7 million (1 in 11) children and 18.7 million adults (1 in 12) have asthma (Akinbani, et al, 2012). Though asthma can affect anyone, it more frequently affects racial and ethnic minorities and individuals of lower socioeconomic status (Bloom, Cohen & Freeman, 2011).

Asthma is a chronic inflammatory disease of the lower respiratory tract. According to the National, Heart, Lung Blood Institute, National Asthma Education Prevention Program (NHLBI, NAEPP) Expert Panel 3 (2007), acute exacerbations of asthma are characterized by airflow limitations, inflammation and airway hyper-responsiveness. The NHLBI/NAEPP panel reported that symptoms may be identified by persistent cough, wheezing and shortness of breath. Though a specific cause for asthma has not been identified, the panel reports that exposure to allergens, respiratory illness, exercise, and smoke can trigger an exacerbation. There is no cure for asthma; however there have been many advances in prevention through maintenance management of asthma over the past two decades. With appropriate drug therapy, avoidance of asthma triggers, education regarding asthma management and routine follow up with a healthcare provider most emergency department (ED) visits and hospitalizations can be avoided (NHLBI, NAEPP, Expert Panel 3, 2007).

Despite advances in daily management of asthma including evidence supporting the fact that patient education improves asthma outcomes, patients/families report that they do not receive routine education for asthma management. The Community Health Center (CHC) site is a Patient Centered Medical Home (PCMH) invested in improving chronic disease management

through ongoing education and support. Therefore the project evaluated a nurse lead asthma education and care coordination program within a primary care PCMH.

Significance of the Problem

The chronic illness of asthma continues to be a large burden to patients and families affected by asthma, the health care system, as well as society in general (Szeffler et al. 2011). Though many chronic illnesses primarily affect older adults, asthma differs in that it affects people of all ages, and often begins in childhood. Asthma is the leading cause of chronic disease and disability in children (Bousquet, J, Bousquet, PJ., Godard & Daures, 2005). Because of the broad impact of asthma Healthy People 2020 includes a goal to “Promote respiratory health through prevention, detection, treatment and education efforts” (HHS, 2012).

Asthma prevalence among African Americans is 9.2%, individuals of Puerto Rican descent is 14.5%, and Whites of 8.1% (Bloom, Jones & Freeman, 2013). Furthermore, African American children are 3.6 times more likely to visit the emergency department for asthma than are non-Hispanic White children (Office of Minority Health (OMH), 2013). From 2003-2005, African American children had a death rate seven times that of non-Hispanic White children (OMH, 2013) Puerto Rican children are 3.2 times more likely to have asthma than are non-Hispanic Whites. Hispanic children are 40 percent more likely to die from asthma than are non-Hispanic White children (OMH, 2013). People living below the poverty level are also affected at a rate of 10.3% compared to those living above the poverty level which is 6.4% to 7.9% (Bloom, Cohen & Freeman, 2011).

With asthma affecting so many Americans both the direct and indirect costs to our healthcare system are enormous. Direct costs of asthma care include provider visits, hospital

care, prescriptions, morbidity and mortality. The total cost in the United States is \$50 billion dollars, with the largest cost incurred for in hospital care (Office of Epidemiology & Laboratory Services, 2011).

The indirect cost of asthma care is estimated at \$6 billion annually (Office of Epidemiology & Laboratory Services, 2011). Children with asthma miss an average of 2.48 more days of school per year compared to their children without asthma (Corso & Fertig, 2009). Adults with asthma miss an average of 5.7 days of work per year related to asthma exacerbations (Corso & Fertig, 2009). A report from The Partnership for America's Economic Success (2009) estimates that of US children born in the year 2000, approximately 380,000 will develop asthma. The total costs for their asthma care will be \$7.2 billion over a lifetime with \$3.2 billion in direct medical costs and \$4 billion in loss of work or productivity (Corso & Fertig, 2009).

The Asthma Insight Management (AIM) survey of more than 2,500 persons with asthma, 1,000 adults without asthma, and 300 medical providers concluded that asthma care remains sub-standard, despite the large amount of health care resources devoted to it (Blaiss, 2010). The survey highlights the following concerns:

- Compared to the general population people with asthma had poorer health, activity limitations, and twice as many sick days.
- Patients with asthma carry an emotional burden of the disease and feel angry, depressed, fearful and isolated.
- Asthma patients reported “moderate to extremely bothersome” asthma symptoms (coughing, wheezing or shortness of breath) lasting a number of days in the past year.
- One third of the asthma patients’ survey reported that they had an emergency department visit or hospitalization in the past year.

- Asthma patients tend to overestimate how well controlled their asthma is.
- Non Adherence to daily asthma medications tends to be a common occurrence.
- Providers tend to communicate terms for asthma that patients don't understand such as "exacerbations".

Similar to the results of the AIM survey, residents of New England reported that asthma significantly impacted their quality of life (Hoppin & Stillman, 2010). Approximately two-thirds of children and adults with asthma report that their asthma was "not well controlled" or "poorly controlled" (Hoppin & Stillman, 2010, p.7). At least one in five adults reported that asthma limited their activities of daily living to a moderate or severe extent (Hoppin & Stillman, 2010). Seventeen to twenty percent of adults reported that they had changed jobs due to asthma (Hoppin & Stillman, 2010).

In Connecticut, 11.3% of children and 9.2 % of adults have asthma. The burden of asthma remains great and is the primary reason for pediatric hospitalizations in the state (Peng & NePaul, 2013). According to the Asthma Call Back Survey (ACBS) 48% of respondents had asthma that was not well controlled while "approximately 54% limited their usual activity due to asthma" and 65% of asthma patients stated that they had never been given an asthma action plan, a tool well supported as aiding in management asthma (Behavioral Health Risk Factor Surveillance Survey (BRFSS), 2010 p.8). Adults with asthma missed 5.1 days of work in the past 12 months, while children with asthma missed 2.3 days of school related to asthma (BRFSS, 2010).

The economic burden of asthma continues to rise. Connecticut's five largest and poorest cities (Bridgeport, Hartford, New Haven, Stamford & Waterbury) account for the highest rates of hospitalizations and emergency department (ED) visits in the state (Peng & NePaul, 2013). The

most recent data available from the Department of Public Health reports that in 2009, Connecticut residents spent over \$112 million in acute care for the primary diagnosis of asthma. Of that total, \$80.3 million was spent on hospitalizations and \$32 million was spent on emergency department visits with the primary diagnosis of asthma. Sixty-nine percent of these admissions were paid for by public funds, Medicaid or Medicare (Peng & NePaul, 2013).

The evidence indicates that asthma continues to be a challenging chronic disease to manage on a national, regional and local level. Minorities, and those living in poverty, tend to need emergency care and hospitalizations more often than other groups. The purpose of the project was to develop a standardized nursing pediatric asthma education and care coordination program at Community Health Center, Inc. (CHC) clinics located throughout the state of Connecticut a primary care PCMH. The aim of this project was to evaluate asthma care provided to pediatric patients at the CHC through scheduled nursing visits for asthma education and care coordination.

Review of the Literature

A review of current asthma care literature was conducted to provide a background for this proposed project. Articles were identified using three databases: Pub Med, CINAHL and Cochrane Review. Articles were also identified by evaluating reference lists of reviewed articles. The search terms used were; *primary care, asthma, child, adolescents, asthma education, nursing care, patient centered care, disease management and case management*. The search was limited to English only articles written after 2007. The literature review was conducted using the Prisma method (Liberati et al, 2009). Originally 300 articles were identified through the search. After removal of duplicate articles and articles that were not in peer reviewed journals, 78 articles were screened for review. Articles were excluded from this review if they, a). did not address pediatric asthma, b). tackled adult asthma research only, c). concentrated on asthma care in the acute care setting, or d). combined asthma with other disease conditions. Three meta-analyses were included in the review, each with a different focus. One focused primarily on physician and nursing care related to asthma (Keuthe, Vaessan-Verberne, Elbers & Van Aalderen, 2013) while the other articles focused on patient education and asthma specialty clinics respectively (Wolf, Guevera, Grum, Clark & Cates, 2008; Bashinab & Kamer, 2012).) Six randomized control trials (RCTs) and one meta-analysis were on topics of asthma education, school based interventions, technology-based interventions, and practice improvement or redesigns. Twenty-one articles were non-experimental research and quality improvement studies which focused on provider education, patient education, and primary care practice redesign. Another article was a systematic review with the focus on patient education.

The review findings are presented in order of significance to the project, starting with education for patients, providers and laypersons. This will be followed by results of telephonic case management, preventative care, and specialty/primary care clinics.

Patient Education

According to the recent literature, asthma education can be provided in a variety of settings including the home, primary care practices or in schools. A meta-analysis of 32 studies including more than 3,000 patients concluded that patient education reduced emergency department visits, school and work absenteeism and showed moderate improvement in lung function (Wolf, Guevara, Grum, Clark & Cates, 2008).

Britto et al. (2014) were able to improve asthma care in adolescents by instituting practice redesign using the chronic care model. The practice changes included development of care coordination, structured education and community outreach. A total of 377 adolescents participated in the project, and resulted in 86% of patients having action plans, as well as a two point improvement in the Asthma Control Test (ACT) in patients with poorly controlled asthma. Lastly, individuals reported that their confidence to manage asthma increased from 70 to 85 %.

Wood & Boolyard (2011) reported through a retrospective chart review that patients who received asthma education from nurses in pediatric practices had lower lengths of stay (1.25 days versus 2.32 days) when hospitalized. The costs associated with the hospital stay were also significantly less; \$4,756 compared to \$ 8,715 to other local children.(Wood & Boolyard, 2011).

Another study estimated the cost savings when providing asthma education in an inner city clinic. Participants (N=242) received education and enhanced primary care. Results concluded that there was a significant increase in prescribing controller therapy ($p<.01$), a reduction in asthma severity ($p<.01$), a reduction in emergency department visits ($p<.01$) and

near reduction in hospitalizations ($p < .059$). The authors report a conservative cost savings per enrolled participant as \$4,000.00 per year (Grant et al. 2010).

Two randomized control trials (RCTs) identified that home based environmental education improved patient outcomes. Krieger et al. (2009) compared children who received usual office education (control group) with a group of patients who received asthma education by a nurse and community health worker (CHW) in the home. Results revealed that patients decreased their use of urgent care by 23.1% in the home visiting program compared to only a 17% decrease with the office-based program. Both groups had statistically significant decreases in missed work and school days, and also decreased in limitation of activities.

Tzeng et al. (2010) had similar results in their study. Seventy -five children and families were enrolled in either “usual care” asthma education (control group) compared to children who received home visiting by specialty trained asthma nurses. Patients in the experimental group had statistically significant improvement in environmental management ($p > .05$). The experimental group also had improvement in asthma symptoms and lung function compared to the control group.

The systematic review (Brower & Brand, 2008) also supported the previous research on the need for routine patient education and use of asthma action plans. The authors recommend that education should include discussion of the disease process, inhaler technique and importance of medication adherence (Brower & Brand, 2008). In summary the results of the studies support the need for asthma education to improve clinical outcomes as well as reduce emergency department and inpatient utilization and therefore overall costs.

Provider Education

Three studies identified the impact of provider education on the improvement of asthma outcomes. The first study (Ragazzi, Keller, Ehrensberger & Irani, 2010) concentrated on implementation of the asthma guidelines in multi-site primary care practices. The researchers used retrospective chart reviews and semi-structured interviews to assess the provider's use of the asthma guidelines following a provider training and educational sessions on the use of guidelines and spirometry. Part two of the education and training included: practice redesign, decision support and implementation of an optimal asthma program. Results of the program implementation revealed that documentation improved in 5 out of 6 practices while patient education and use of asthma action plans increased in 4 of the 6 practices. Two practices displayed improvement in use of spirometry.

A second study involved implementation of the chronic care model (CCM) in a hospital based residency training clinic. Fifty-nine residents participated in the CCM education. Post intervention chart reviews revealed that the residents had increased the use of guidelines and in development of asthma action plans. Subsequently, patients cared for by the residents, had a 42% decrease in use of the emergency department (Greene, Rogers & Yedida, 2007).

The final study included provider and staff training regarding the NHLBI guidelines with specific focus on the appropriate use of inhaled corticosteroids, action plans and severity assessment. Results are consistent with previous studies including: a decrease in rates of ED visits, hospitalizations and acute care visits. Improvement in use of inhaled corticosteroids was statistically significant ($p > .001$) and a reduction in use of bronchodilators was also significant ($p > .05$) (Cloutier, Jones, Hinckson & Wakefield, 2008).

These three studies indicate the importance of the ongoing education of providers in management of this chronic illness. Consequently, following the education, providers did use asthma action plans as recommended in the guidelines, with two of the three studies also reporting a decrease in acute care utilization.

Asthma Education Performed by Non-healthcare Workers

The first study was a RCT which utilized parent mentors to improve outcomes in minority children. Following training, the mentors made monthly calls and visits with the intervention group while the control group received usual care. Results concluded that families who had high participation rates in the program had statistically significant reduction in asthma exacerbations, ED visits and missed school and work days (Flores et al, 2009).

A second RCT had similar results using “coaches” who had regular visits with families as well as the documentation of high-risk patients within a registry. Results indicated that the control group had urgent care visits 30% of the time while the intervention group only required urgent care visits 16% of the time. The parental quality of life score showed greater improvement in the intervention group compared to the control group (Garbutt, Highstein, Yan, Shink, 2012).

Nelson et al. (2011) utilized parent mentors in a RCT. After receiving training, parent mentors provided asthma education and home monitoring to children and families. Results identified an improvement in asthma management, home monitoring and the development of collaborative relationships between patient and physician compared to the control group who received usual care. Each of these RCTs supports the benefit of having a parent mentor available as part of the team needed to care for children with asthma. Parent mentors or coaches may have the greatest value to high-risk patients.

Preventative Management

Yee, Fagnano & Halterman (2013) examined the frequency that preventative asthma care was discussed during routine primary care visits. This non-experimental study conducted using telephonic follow up survey with families 2 weeks after routine clinic visits. This study enrolled 171 children over 6 pediatric offices in a 2 year period. Researchers concluded that overall preventative asthma teaching was very low. Specifically children with mild persistent asthma were the least likely to receive education regarding trigger control plans, environmental management. Results were statistically significant for not supplying these patients with asthma action plans ($p > .01$) compared to patients with moderate to severe persistent asthma.

The next study, an RCT, compared asthma management via telephonic case management to face-to-face case management compared to a group that received usual care. Results concluded that follow up care was performed 66.4% of the time with the telephone only group compared to 53.8% of the face-to-face only patients and 50% of the patients in the usual care group. Morbidity was equal among the three groups. However, statistically significant improvements in enablement ($p > .003$) and confidence ($p > .007$) were noted in the telephonic only group. Finally, the authors conclude that this was a lower cost option and should be considered for routine follow up asthma care (Pinnock et al., 2007).

Another RCT compared e-health and telephonic care management to a control group of children receiving usual care (Gustafson et al., 2012). Three hundred and five children and their families were randomly assigned to either the research or control arm. Results concluded that symptom free days improved in the intervention group ($p > .001$) compared to the control group ($p > .29$). The asthma control score also significantly improved. ($p > .001$) compared to the control

group ($p > .22$). There was no significant difference in medication adherence in either group (Gustafson et al., 2012).

Several studies supported the use of telephonic case management to improve clinical and quality of life outcomes (Yee, Fagnano & Halterman, 2013; Pinnock et al., 2007; Gustafson et al., 2012). Additionally, statistically significant results were identified in asthma control and confidence. Though telephonic case management has shown to be cost effective our current healthcare system is not equipped to reimburse practices to utilize this service as a part of their team.

Specialty/Primary Care

One RCT compared asthma care provided by a nurse, general practitioner or pediatrician. Follow up care was compared at baseline, year one and year two (Keuthe, Vaessen-Verberne, Mulder, Bindels & Win van Aalderen, 2011). Results show no difference in FEV1 when care was provided by nurse, general practitioner or pediatrician. There was also no difference in exacerbations in any one of the three groups. Lastly nurses were confident to handle asthma medication management, they did, however, consult a physician 34% of the time.,

A meta-analysis also compared nurse versus physician asthma care. Results identified 5 studies which compared direct and indirect costs, ACT results and frequency of exacerbations. There was no statistical differences in outcomes compared to care given by nurses versus physician care (Keuthe, M., Vaessan,-Verberne, AAPH, Elbert, AG, Van Aldereman, WMC, 2013).

The final study was a meta-analysis of asthma specialty clinics in primary care practices. After a search, three studies met the criteria for review (Bashinab & Karner, 2012). There was no statistically significant difference in ED visits or hospitalizations when looking at all three of

these studies. The only significant difference between groups was a decrease in nighttime symptoms in the specialty clinic groups (Bashinab & Karner, 2012).

These studies and meta-analysis support nurses and nurse practitioners providing asthma care to a majority of patients. In fact, ACT scores and acute care utilization is largely the same when comparing nurses, physicians and specialty providers.

Discussion

The current asthma literature is congruent with the NHLBI, NAEPP Expert Panel 3 (2007) which recommends four necessary components to improve outcomes for patients with asthma including: a). objective measurement of lung function (PFT or spirometry) to assess severity and maintain control, b). comprehensive pharmacotherapy to reverse inflammation and prevention of lung function loss and c). treatment of acute exacerbations, d.) patient education at every visit, including advice on management of environmental triggers for home, work or school. The Patient Protection and Affordable Care Act (PPACA) identified specific recommendations for children with asthma including a team approach for management in the Patient Centered Medical Home (PCMH). The concept of the PCMH originated through the American Academy of Pediatrics and is defined as “Care within the medical home should be accessible, continuous, comprehensive, patient and family centered, coordinated and compassionate and culturally effective (American Academy of Pediatrics, 2015). Collectively the studies reviewed show the greatest success and improved patient outcomes when using a “team approach” to manage a chronic illness. In the team-based approach the improvements in asthma outcomes are achieved in a variety of ways such as through telephonic follow up calls, parent mentors, home-based services or school-based interventions. In fact, many of the studies supported nurses being an integral part of asthma management.

Theoretical Framework

The Knowledge Translation Framework, Ottawa Model for Research Utilization (OMRU) was chosen to frame the proposed project. This model was first developed by Logan and Graham in 1998. The model “focuses implementation efforts on existing knowledge that is ready to be shared” (p.227). In 2004, the model was revised to include “three phases and six primary elements necessary to consider when implementing research into practice” (White & Dudley-Brown, 2013, p.39). The 3 model elements include: a). assessment of key elements, b). monitoring implementation and c). evaluation of outcomes. The primary components associated with the assessing key elements include: the practice environment (structure, culture, patients and economic), potential adopters (attitudes, knowledge and skill) and evidence based innovation (innovation attributes and developmental process). Components of monitoring the implementation of the intervention are: barrier management, transfer strategies and adoption and use. Evaluation outcomes involve: patients, practitioners and the system (Graham, & Logan, 2004).

OMRU was used to implement an asthma education and care coordination program within a primary care PCMH. In assessing the key elements of the practice environment it was noted that the nurses’ role primarily focused on refilling patient medications, triaging phone calls and bringing patients to exam rooms for appointments. The nurses reported that, at times, brief asthma teaching was done at the end of patient appointments when requested by the provider. At that time the leadership team, nursing managers and medical providers began to develop the plan to design and implement the nursing asthma education and care coordination program. When meeting with key stakeholders, barriers were identified. Key concerns included having time carved out for the nurses to schedule appointments and accomplish routine spirometry on

children older than five years. Following the assessment, the nursing staff at CHC sites began to attend day-long trainings for both care coordination and asthma education. On-site asthma education trainings included case studies and hands-on use of devices needed to care for asthma patients.

The second element in the OMRU model is monitoring the implementation of the care coordination and asthma visits (Graham, & Logan, 2004). We expected to encounter resistance to the practice change by the nurses and providers, either due to a lack of understanding regarding the importance of the nurses' role, or by the unwillingness of the nurses' to take on the new role or responsibilities. Each site developed their plan to adopt the care coordination and asthma education visits through their Clinical Microsystems Teams.

At this time, the implementation of the final phase of the OMRU model; to evaluate program outcomes, is appropriate. This project focused on evaluation of the program using data gathered from patients, practitioners, and systems to assess the effectiveness of the intervention.

Project Description, Implementation, and Monitoring

Study Description

This project involved the development and implementation of a thorough evaluation program for the asthma education program recently implemented at CHC. Nursing documentation of asthma education visits, use of asthma training guides, and Asthma Self-Management Handouts were reviewed.

Community Assessment

Though the practicum site is the Community Health Center Inc. (CHC), a FQHC whose original/main location is in Middletown, CT, there are 12 additional locations in 5 counties throughout the state. The focus of this community assessment was on pediatric asthma issues in the Community Health Center locations throughout the state.

According to the state Department of Public Health, asthma is one of the three chronic disease priorities (Peng & NePaul, 2013). In fact children have been identified as priority for asthma intervention in Connecticut (Peng & NePaul, 2013).

Connecticut residents continue to have higher rates of asthma (15.3%) when compared to the national average of 12.6%. Approximately 11.3% of children throughout the state of Connecticut had asthma in 2010. The prevalence of children whose family income was less than \$15,000 annually was double that of children whose family income was greater than \$75,000 annually. Nineteen percent of obese children also were diagnosed with asthma. Acute care visits for asthma were highest among children under the age of four years. Hispanic children had the highest rates of asthma emergency department (ED) visits in the state. Overall among children in the state there had been a 38.2 % increase in ED visits from 2005 to 2009. The cost of acute care utilization for asthma continues to rise each year. Medicaid and Medicare were the

funding sources which paid for 73.8 % of ED and inpatient asthma care (Peng & Ne Paul, 2013). Five of their primary care locations were in cities with the highest rates of pediatric asthma hospitalizations in the state (Peng & NePaul, 2013). CHC provides primary care to populations that are largely uninsured (21%), publically insured (63%) and members of racial and ethnic minorities (41% Hispanic/Latino and 14% African American).

Organizational Analysis of CHC

At the time of this project, the Community Health Center, Inc. was a non-profit primary care practice that provided services to 130,000 people across the lifespan locations in 13 cities across the state and served patients in almost every city and town. The philosophy of CHC is that “Healthcare is a right, not a privilege”. Though CHC is open to all, they take pride in providing care, “to those who cannot access care elsewhere” (Community Health Center, 2012). The mission of the organization “committed to ensuring human rights and respecting human dignity; as such, it strives to be a voice and vehicle for social change” (Community Health Center, 2012).

CHC’s clinical staff is made up of Family Practice Physicians, Pediatricians, Internists, Nurse Practitioners, Registered Nurses and Medical Assistants. Though each clinic had specific providers and services, to improve efficiency, there is one central scheduling and nurse triaging services for all sites.

In 2011 CHC was awarded Level 3 National Association Quality Assurance (NCQA) patient centered medical home (PCMH) accreditation. In 2014 CHC again achieved level 3 NCQA PCMH accreditation (M.B. personal communication, November 13, 2014). This PCMH provided integrated care for patients including on site dental and behavioral health services. A full spectrum of supportive services included smoking cessation, breastfeeding support, diabetes

education, telephonic disease management, podiatry, on site pharmacy and case management as needed. CHC reports it strives to provide comprehensive primary care in order to “improve the health of our patients, their families and community”. Research and Innovation was a priority of the organization. For example, CHC was at the forefront of electronic health record utilization as early-adopters, as well as pioneering the “Nurse Practitioner” residency program (Community Health Center, 2012).

Evidence of Stakeholder Support

Key stakeholders for the success of this project included the CHC leadership team, primary care providers/school based health center providers, nurse managers and nursing staff. The Chief Nursing Officer had been crucial in making this a priority at each of CHC’s sites. The consultant nurse researcher had done a great job in coordinating the nursing education and training sessions. Support staff such as office receptionists/schedulers and medical assistants were key. Though they did not attend the nursing trainings, the staff was educated about the project and their roles in identifying patients and scheduling of the asthma education nursing visits.

Resources, Facilitators and Challenges

Several resources were utilized to evaluate the asthma education/care coordination program implemented at CHCI. The DNP student utilized the NHLBI/NAEPP Expert Panel, 3 2007 asthma guidelines and the American Nurses Association White Paper on the Value of Nursing Care Coordination to identify specific measures to be collected. Working with the CNO, the DNP student completed the IRB application, which was required to carry out the evaluation and publish results. The CNO was the facilitator of this DNP’s entire project, which included weekly meetings with the DNP student for ongoing planning and feedback. She had

worked with the Chief Medical Officer and administration to obtain support to encourage the ongoing asthma education/care coordination nursing visits and evaluate the project to date.

When primary care providers were questioned regarding their thoughts of nurses scheduling education/care coordination visits, all primary care providers provided feedback expressing that they get overwhelmed with the management of these patients and desire this resource in their office.

There were challenges to implementing this project. The biggest challenge identified was obtaining IRB approval to begin the project. Other challenges included procurement of patient data in a timely manner and ensuring that there was enough data collected to ensure meaningful results. Time in completing chart reviews was delayed due to the time it took the institutional review board (IRB) at CHC to respond to the DNP student request for access to the EHR. Outside barriers identified are obtaining patient “buy in” as to the importance of the visits. Lastly though the Medicaid ASO is supposed to provide CHC with patient data regarding emergency department and hospital visits in a timely manner however the current data provided can be as delayed at least 2 weeks after emergency department visit or inpatient hospitalization. The data regarding emergency department visits and hospitalizations was not available.

The asthma education and care coordination program was developed based on both the NHLBI, NAEPP, Expert Panel 3, 2007 guidelines and ANA White Paper and Agency for Health Care Quality (AHRQ) value of nursing care coordination. Nurses were educated in group format using a power point presentation, discussion, demonstration of device use and hands on case studies. Working with the CNO, the DNP student developed the Asthma Education/Care Coordination template to be utilized in the EHR. This was followed by obtaining permission to

use education materials initially developed by an asthma education program in Rhode Island to be utilized by the nurses and the Asthma Self-Management handouts.

Project Design

The DNP student worked with the CNO and the health center's nursing researcher to evaluate an implementation of pediatric asthma education/care coordination visits that are provided by nurses in the PCMH. Over the past several months, nurses received education on the purpose and need for the practice change regarding pediatric asthma. Following the introduction, specific education regarding asthma pathophysiology, assessment of asthma utilizing the Asthma Control Test (ACT), which is a validated tool to assess a patient's ongoing asthma control, management, pharmacology, action plans and environmental trigger control plans were done. Care coordination education was also completed during this session using the model outlined in the American Nurses Association on the Value of Nurse Care Coordination and the model depicted by Agency for Health Research and Quality (AHRQ).

A second portion of the training session was considered "hands on" around use of the specific asthma devices (holding chambers, inhalers, nebulizers and peak flow meters). Nurses were given a review of how and when to conduct spirometry for patients over the age of five years. Case study examples were incorporated with the asthma education; spirometry and coordination of care to ensure nurses had every day examples of the application of this new knowledge. The session concluded with the documentation process for patients who have asthma education and care coordination appointments. Concurrently with education sessions asthma patient education materials that are culturally sensitive and low literacy were obtained and are available in both English and Spanish.

The implementation phase of the OMRU model included the nursing staff at CHC carrying out asthma education/care coordination visits for identified patients. Since the organization is a PCMH practice, the nurses' met with primary care providers in their "daily

huddle/practice management” to review the patients scheduled to have asthma visits that day. At the time of the meeting the team decides if the patient needed spirometry to be completed as well as other specific care coordination topics such as pharmaceutical assistance to obtain medications or community referrals. Following each visit nurses documented in the electronic health record (EHR) and communicated to the primary care provider about the visit including concerns, recommendations and plan for follow up. During this time the DNP student was available as a resource to nurses at any of the CHC sites.

The final step in the educational project and the focus of this proposed DNP capstone project was the evaluation component of the OMRU model. This consisted of chart reviews to identify that components of asthma education and care coordination are documented in the electronic health record as directed. Results were compiled using the statistical package for social science (SPSS) to analyze data and then reviewed with the Chief Nursing Officer. A meeting will be scheduled to review results with the site nurse managers and nurses participating in the project. The results of this evaluation will be used to improve the asthma education/care coordination program at the CHC.

The project specific goal and objectives:

The purpose of the project was to evaluate a standardized nursing pediatric asthma education and care coordination program at Community Health Center, Inc. (CHC) a multi-site PCMH located throughout the state of Connecticut. The aim of the CHC asthma program was to improve asthma care through the development of a standardized pediatric asthma education and care coordination program at the area clinics. The objective of this project was to evaluate the implementation of nursing asthma education and care coordination visits provided at CHC, Inc. Specific measures collected included:

1. Number of nursing visits for asthma education/care coordination before program implemented
2. Number of pediatric asthma patients, versus number of asthma education/care coordination after program implementation
3. Number of pediatric asthma patients.
4. Number of patients with asthma action plans
5. Number of patients with Asthma Control Tests (ACT) completed
6. Number of improved ACT scores, as well as correct asthma medications for diagnosis

Goal 1: All nurses at the CHC will be able to provide asthma education and care coordination in the Patient Centered Medical Home (PCMH).

Objective 1: At least 10% of patients at selected sites will have pediatric asthma visits following implementation of asthma education/care coordination program.

Objective 2: By March 2015 at least 25 % of pediatric patients will have appropriate medications for diagnosis.

Objective 3: By March 2015 at least 30 % of pediatric patients will have an asthma action plans

Goal 2: At least 25 % of patients receiving asthma education/care coordination will report improved health status

Objective 1: Improvement in the ACT score ($\#>19$) or ($\#<19$)

Costs and Budget

CHC provided the budget for this project. Specific costs include: a). paying for staff training time, b). Reference materials for staff, c). Copying and printing of patient educational materials, d). purchasing of In Check Dials for patient teaching and, e). Valve holding chambers and peak flow meters for patients.

IRB Approval and Protection of Human Subjects

Although the proposed project was considered a quality improvement plan for this PCMH practice; CHC required IRB approval since a student was accessing the patient EHR and PHI. When reporting outcomes of the intervention, no personal identifiers will be used. All data including age and gender will be de identified and reported in aggregate form.

Evaluation

Prior to beginning the project, IRB approval was obtained from Community Health Center, Inc. The evaluation of the Asthma Education/Care Coordination program began in March 2015 following conclusion of the final nursing education and training and implementation of the program at the final two CHC sites. A total of three sites that implemented the asthma education program were evaluated. The selected sites had begun the asthma education and coordination program in the first half of 2014. The evaluation plan was to compare an 8-month pre-intervention period (6/1/2013 to 2/28/2014) and 8-month post-intervention period (6/1/2014 to 2/28/2015) for pediatric asthma care for patients with respect to the implementation of the comprehensive program for Care Coordination in Fairfield County. The roll out for Care Coordination took place during the month of May 2014 for Fairfield County sites. The time periods were selected to match in terms of chosen months in order to take into account the seasonal variation in asthma to ensure a similar pre and post comparison.

Data for the evaluation was obtained through a retrospective chart review of CHC electronic medical records for patients' age 1 to 17 years who had been seen between 6/1/13 and 2/28/14. The Business Intelligence Department (BI) of the organization extracted all data from the three sites under evaluation. The data was provided to the DNP student in an Excel file which was then entered into a statistical package for analysis.

Data Analysis

The data was analyzed using the Statistical Package for the Social Sciences (SPSS) version 22 to create frequency and percentage tables for both the pre-intervention and post-

intervention data (See Appendix A & B). Descriptive statistics and percentage calculations were used to present the results.

Results

Demographic

The demographics of the population are listed in Appendix A. The project sample was 8,188 children, of these 53.2% were females (n=4359) and 46.7% were males (n=3829). Children ranged in age from 1 to 17 years, 3.1% were under 2 years (n=256), 18.5 % were between the ages of 2 to 5 years (n=1516), 42.2 % were between 6 to 11 years (n=3457) and 36.1% were between 12 and 17 years of age (n=2959). Of the children receiving care at CHC 46% were insured by Medicaid and another 4% were uninsured.

Evaluation of the Asthma Education and Care Coordination Program

The first goal was that all nurses will be able to provide asthma education and care coordination to pediatric patients in the Patient Centered Medical Home (PCMH). This goal was met and all nurses (n=36) at 12 sites attended the entire training session. The first objective was that at least 10% of patients at selected sites will have pediatric asthma nursing visits following implementation of the program. This was not met. When extracting the structured data the BI was unable to locate any use of the nursing templates being developed for documentation of nursing visits. Instead on further review nurses were still using other areas of the medical records such as “telephone encounters” section to document education or care coordination interventions. Objective two for this evaluation was that at least 25 % of patients with mild persistent and moderate persistent asthma would have appropriate medications ordered for severity of diagnosis. This was met with 93% of patients (n=1937) having documentation of appropriate drug therapy when diagnosed with mild persistent and moderate persistent asthma. The third objective was that by March 2015 at least 30% of pediatric patients will have an asthma action plan on record. This objective was not met with the results showing that prior to

implementation of the program 7.6% (n=327) patients had asthma action plans and post intervention only 6.6% (n=213) patients had asthma action plans.

The second goal was that at least 25 % of patients will report improved health status. This goal was achieved. The objective of improvement in ACT scores was met. There was a slight increase in patients having improved ACT scores. Pre Intervention 87% of patients (n=4248) had an ACT score of 19 or greater; while post intervention 89% of patients (n=6790) had an ACT score of 19 or greater.

Discussion

The evaluation of the Asthma Education and Care Coordination program indicates that this program is in its infancy. The development and implementation of the pediatric asthma education program was part of a larger Care Coordination program being developed at CHC for multiple chronic diseases including diabetes, heart failure, COPD and hypertension. CHC is a very large, multisite and practice change impacts nursing as well as the entire primary care organization. By having nurses provide visits for education and care coordination this meets the recommendations of the Institute of Medicine [IOM, 2010] which include:

- Nurses should practice to the full extent of their education and training.
- Nurses should achieve higher levels of education and training through an improved education system that promotes seamless academic progression.
- Nurses should be full partners, with physicians and other health professionals, in redesigning health care in the United States
- Effective workforce planning and policy making require better data collection and an improved information infrastructure

Unfortunately, the results of this program evaluation show that goals and objectives were not met at this time. By identifying key barriers in the evaluation, the organization may move forward to meet not only the goals and objectives of this project, but also meet IOM recommended goals.

There were three barriers identified that inhibited successful implementation of the project. The first barrier recognized was that shortly after the program was implemented in the Fairfield County sites the CNO left the organization. The new CNO agreed that change in leadership made it challenging to carry out the program due to competing priorities within the

organization. The second barrier identified was time constraints around scheduling “nursing” visits because of other tasks such as administering immunizations and assisting with other procedures requested by health providers. The third barrier identified through this evaluation process was that during the implementation phase, nurses relied on the providers to refer patients for the education visits. A “standing order” for the visits would allow nurses to carry out the visits utilizing data from the dashboards. At this time, the proposal for a standing order is under review. Once approved the nurses will be able to utilize the dashboard and schedule patients without a referral.

Though the desired outcomes of the educational program were not achieved at this time, the nurses attending the education and training sessions were fully engaged and asked many questions. Some even asked the DNP student to return for future trainings. In fact the DNP student provided consultation for complex patients to nurses at the Fairfield County sites as well as other sites such as Clinton, Middletown and Meriden

Conclusion

Nurses in a PCMH are an integral part of improved asthma management through patient education and care coordination. However, the challenge to the organization is to see these interventions as a priority of the nurse's role. These interventions cannot be "fit in" if time permits. A creative scheduling system may be necessary. Scheduling options may include group visits, early morning, evening or Saturday hours.

Final recommendations include a refresher course for the nurses followed by in person support during the visits and documentation requirements. The DNP role as a clinical expert in providing support to direct care nurses is imperative to make a research translation project successful as we move from an acute care model to that of a preventive and management of chronic disease.

References

- American Academy of Pediatrics. Definition of a Patient Centered Medical Home. Retrieved from <https://medicalhomes.aap.org/Pages/default.aspx> Accessed: May 5, 2015
- National Center for Environmental Health: Asthma's impact on the nation. (2014). Retrieved from <http://www.cdc.gov/NCEH/> Accessed: January 18, 2015
- Auger, K., Kahn, R., Davis, M., Beck, A., Simmons, J. (2013). Medical home quality and readmission risk for children hospitalized with asthma exacerbation. *Pediatrics*, 131(64), 63-70. doi:10.1542/peds.2012-1055
- Bashan, E., & Karner, C. (2012). Primary care based clinics for asthma. *The Cochrane Database of Systematic Review*, (4), 1-34. doi:10.1002/14651858.CD003533.pub2.
- Berger, L., Patel, S., Komati, C., Zhang, G., & Wallace, M. (2014). Linking patient-centered medical home and asthma measures reduces hospital readmission rates. *Pediatrics*, Vol, issue 249-256. doi:10.1542/peds.2013-1406
- Blaiss, M. (2010). "Asthma insight management (AIM) a national survey of asthma parents, the general population and healthcare providers". *Acaai*, (Supplement), 1-112.
- Bollyard, M. & Wood, D. (2011). Making education count: Nurses role in asthma education using a medical home model. *26* (6), 552-553-558. doi:10.106/j.pedn.2010.06.009
- Bricker, P., Baron, R., Scheirer, J., DeWalt, D., Derrickson, J., Yunghans, S., & Gabbay, R. (2010). Collaboration in Pennsylvania: Rapidly spreading improved chronic care for patients to practices. *Journal of Continuing Education in the Health Professions*, 30(2), 114-125. doi:10.1002/chp.20067

Britto, M., Vockell, L., Munafo, J., Schoettker, P., Wimbert, J., Pruett, R., Byczkowski, T.

(2014). Improving outcomes for underserved adolescents with asthma. *Pediatrics*, *133*(e418), 418-427. doi:10.1542/peds.2013-0684

Bunik, M., Federico, M., Beaty, B., Rannie, M., Olin, J., & Kempe, A. (2011). Quality improvement for asthma care within a hospital-based teaching clinic. *Academic Pediatrics*, *11*(1), 58-65.

Clark, M. (2010). Building the chronic care delivery system. Retrieved from

<http://www.theadvisoryboard.com> Accessed: January 18, 2015

Cloutier, M., Jones, G., Hinckson, V., & Wakefield, D. (2008). Effectiveness of asthma management program in reducing disparities in care in urban children. *Annals Allergy, Asthma Immunology*, *100*, 545-550.

Community Health Center, Inc. (2014). Retrieved from

<http://www.chc1.com/Transformational/TransformationalCare.html> ,

Accessed: May 5, 2015

Corso, P., & Fertig, A. (2010). The long term economic costs of asthma. Issue paper # 13:

partnership for America's economic success. Retrieved from

http://readynation.s3.amazonaws.com/uploads/20080924_AngieFertig.pdf

Accessed: January 18, 2015

Diedhiou, A., Probst, J., Hardin, J., Martin, A., & Xirasagar, S. (2010). Relationship between

presence of a reported medical home and emergency department use among children with asthma. *Medical Care Research and Review*, *67*, 450-475. doi:10.1177/1077558710367735

Domino, M., Humble, C., Lawrence, C., & Wegner, S. (2009). Enhancing the medical home model for children with asthma. *Medical Care*, *47*(11), 1113-11125.

- Fifield, J., McQuillan, J., Peele, M., Nazarov, V., & Apter, A. (2010). Improving pediatric asthma control among minority children participating in Medicaid: Providing practice redesign support to deliver a chronic care model. *Journal of Asthma, 47*, 718-727. doi:10.3109/02770903
- Flores, G., Bridon, C., Torres, S., Perez, R., Walter, T., Brotanek, J., Korman, S. (2009). Improving asthma outcomes in minority children: A randomized, controlled trial of parent mentors. *Pediatrics, 122*, 1522-1533. doi:10.1542/peds.2009-0230
- Fortin, M., Chouinard, M., Bouhali, T., Dubois, M., Gagnon, C., & Belanger, M. (2013). Evaluating the integration of chronic disease prevention and management of services into primary health care. *BMC Health Services Research, 13*(132), 2-13. doi:1472-6963/13/132
- Garbutt, J., Highstein, G., Yan, Y., & Strunk, R. (2012). Partner randomized controlled trial: study protocol and coaching intervention. *BMC, Pediatrics, 12*(42), 2-11. doi:1471-2431/12/42
- Graham, K. & Logan, J. (2004). Innovations in knowledge transfer and continuity of care. *Canadian Journal of Nursing Research, 36*(2), 89-90-103.
- Graham, K. & Logan, J. (2004). Using the Ottawa model of research use to implement a skin care program. *Journal of Nursing Care Quality, 19*(1), 18-19-26.
- Grant, R. (2010). Asthma care savings attributable to integrating guidelines-based asthma care in the pediatric medical home. *Journal of HealthCare for the Poor and Underserved, 21*(2), 82-83-92. doi:10.1353/hpu.0.0308
- Greene, J., Rogers, V., & Yedida, M. (2007). The impact of implementing a chronic care residency training initiative on asthma outcomes. *Academic Medicine, 82*(2), 161-167.

Gustafson, D., Wise, M., Bhattacharya, A., Pulvemacher, A., Shanovich, K., Phillips, B., . . .

Kim, J. (2012). The effects of combining web-based e health with telephone nurse case management for pediatric asthma control: A randomized controlled trial. *Journal of Medical Internet Research, 14*(4), 1-25. doi:10.2196/jmr.1964

Halterman, J., Riekert, K., Bayer, A., Fagnano, M., Tremblay, P., Blaakman, S., & Borrelli, B.

(2011). A pilot study to enhance preventive asthma care among urban adolescents with asthma. *Journal of Asthma, 48*, 523-530. doi:10.3109/02770903.2011.576741

Hoppin, P., Stillman, L., & Jacobs, M. (2010). Asthma: A business case for employees and

health care purchasers. *Lowell Center for Sustainable Production and Asthma Regional Council of New England, , 1-27.*

Institute of Medicine. (2010). *The future of nursing: Leading change, advancing health.*

Retrieved from http://books.nap.edu/openbook.php?record_id=12956&page=R1

Accessed April 1, 2015.

Kuether, M., Verberner, A., Mulder, P., Bindels, P., & Aalderen, W. (2011). Pediatric asthma

outpatient care by asthma nurse, pediatrician or general practitioner: randomized controlled trial with two year follow up. *Primary Care Respiratory Journal, 20*(1), 84-91.

doi:10.4104/pcrj.2011.00003

Kuether, M. C., Verberne, V., Elbers, A., & Aalderen, W. (2013). Nurses versus physician-led

care for the management of asthma. *The Cochrane Database of Systematic Review, (2)*, 1-35. doi:10.1002/14651858.CD009296.pub2.

Li, P., To, T., & Guttman, A. (2012). Follow up care after an emergency department visit for

asthma and subsequent healthcare utilization in a universal-access healthcare system. *The Journal of Pediatrics, 161*(2), 208-213. doi:10.1016/j.jpeds.2012.02.038

Liberati, et al, (2009). The Prisma Method for Systematic Reviews and Meta Analyses of studies that evaluate healthcare intervention: explanation and elaboration. *The BMJ*, 339:b2700

doi: <http://dx.doi.org/10.1136/bmj.b2700>

Malveaux, F. (2010). Webinar the affordable care, medical homes and childhood

asthma. Retrieved from <http://win.cdnetwork.org/NewCDN/pdfs/cdn576%20revised.pdf>

Accessed October 10, 2014

Minority health. Retrieved from

<http://minorityhealth.hhs.gov/templates/content.aspx?lvl=3&lvlID=532&ID=617>.

Accessed November 28, 2014.

Nelson, K., Highstein, G., Garbutt, J., Trinkaus, K., Fisher, E., Smith, S., & Strunk, R. (2011). A randomized controlled trial of parental asthma coaching to improve outcomes among urban minorities. *Archives of Pediatric Adolescent Medicine*, 165(6), 520-526.

Nichols, B., Jones, S., Kwong, K., Morphey, T., & Jones, C. (2009). Detection of undiagnosed and Poorly Controlled asthma in a hospital-based outpatient pediatric primary care clinic using a health risk assessment system. *Journal of Asthma*, 46, 498-505.

doi:10.1080/02770900902866776

Office of Disease Prevention and Health Promotion. (2014). Healthy people 2020-respiratory

disease. Retrieved from <http://www.healthypeople.gov/2020/topics-objectives/topic/respiratory-diseases> Accessed November 28, 2014

Peng, J. & NePaul, A. (2013). Asthma Data Brief: A Comparison of Hospitalization Healthcare Use Across Selected Geographic Designations.

Pinnock, H., Adlem, L., Gaskin, S., Harris, J., Smellgrove, C., & Sheikh, A. (2007).

Accessibility, clinical effectiveness, and practice costs of providing telephone option for

routine asthma reviews: phase IV controlled implementation study. *British Journal of General Practice*, 57, 714-722.

Pinnock, H., Fletcher, M., Holmes, S., Keeley, D., Leyshon, J., Price, D., Wagstaff, B. (2010).

Setting the standard for routine asthma consultations: a discussion of the aims, process and outcomes of reviewing people with asthma in primary care. *Primary Care Respiratory Journal*, 19(1), 75-83. doi:10.4104/pcrj.2010.00006

Ragazzi, H., Keller, A., Ehrensberger, R., & Irani, A. (2010). Evaluation of a practice-based

intervention to improve the management of pediatric asthma. *Journal of Urban Health: Bulletin of the New York Academy of Medicine*, 88, 38-48. doi:10.1007/s11524-010-9471-3

Roberts, J., Karr, C., Ybarrondo, L., McCurdy, L., Freeland, K., Hulsey, T., & Forman, J. (2013).

Improving pediatrician knowledge about environmental triggers of asthma. *Clinical Pediatrics*, 52, 527-533. doi:10.1177/0009922813482752

Silver, A., Figge, J., Hakin, D., Pryor, V., Fuller, K., Lemme, T., O'Brien, M. J. (2011). An

asthma and diabetes quality improvement project: Enhancing care in clinics and community health centers. *Journal of Community Health*, 36, 180-190. doi:10.1007/s10900-010-9296-8

Straus, S., Graham, I. & Mazmanian, P. (2006). Knowledge translation: Resolving the confusion.

The Journal of Continuing Education in the Health Professions, 2, 3-4. doi:10.1002/chp.45

Tapp, H., Hebert, L., & Dulin, M. (2011). Comparative effectiveness of asthma interventions

within a practice based research network. *BMC Health Services Research*, 11(188), 1-10. doi:1472-6963/11/188

Tsai, A., Morton, S., Mangione, C., & Keeler, E. (2008). A meta-analysis of interventions to

improve care for chronic illnesses. *American Journal of Managed Care*, 11(8), 478-488.

Tzeng, L., Chiang, L., Hsueh, K., Ma, W., & Fu, L. (2010). A preliminary study to evaluate a patient-centered asthma education programme on parental control of home environment and asthma signs and symptoms in children with moderate to severe asthma. *Journal of Clinical Nursing, 19*, 1424-1433. doi:10.1111/j.1365-2702.200903021.x

U.S. Department of Health and Human Services, Healthy People 2020. (2012) *Respiratory Diseases*. Retrieved from <http://www.healthypeople.gov/2020/topicsobjectives2020/overview.aspx?topicId=36>, Accessed January 5, 2015

US Department of Health and Human Services, National, Heart, Lung and Blood Institute & National Asthma Education Prevention Program, Expert Panel 3. (2007). Guidelines for the diagnosis and management, Accessed August 4, 2014.

Wagner, E. H. (2014). The chronic care model. Retrieved from http://www.improvingchroniccare.org/index.php?p=The_Chronic_Care_Model&s=2
Accessed October 10, 2014

Washington, D., Yeats, K., Sleath, B., Ayala, G., Gillette, C., Williams, D., Tudor, G. (2012). Communication and education about triggers and environmental control strategies during pediatric asthma visits. *Patient Education and Counseling, 86*, 63-69.
doi:10.1016/j.pec.2011.04.015

White, K. & Dudley-Brown, S. (2012). *Translation of evidence into nursing and health care practice*. New York, New York: Springer Publishing, LLC.

Yee, A., Fagnano, M., & Halterman, J. (2013). Preventive asthma care delivery in the primary care office: Missed opportunities for children with persistent asthma symptoms. *Academic Pediatrics, 13*(2), 98-104. doi # <http://dx.doi.org/10.1016/j.acap.2012.10.009>

Appendix A Patient Demographics

		Total	Percentage
Gender	Female	4,359	53.2%
	Male	3,829	46.7%
Age	<2 years	256	3.1%
	2 to 5 years	1,516	18.5%
	6 to 11 years	3,457	42.2%
	12 to 17 years	2,959	36.1%
Race	African American	1,248	15.2%
	American Indian	12	.0014%
	Asian	190	.023%
	Other	81	.009%
	Undetermined	4954	60.5%
	Unknown	207	.025%
	Unreported	660	8.1%
Ethnicity	White	841	10.26%
	Hispanic	5,477	65%
	Non-Hispanic	1,898	23%
	Other	252	3.0%
Financial Ins.	Unreported	816	9.0%
	Affordable Care Act	7	.0008
	Medicaid	3800	46.4%
	Private Ins.	709	8.6%
	Uninsured	404	4.9%
	Unknown	3,273	39.94%

Appendix B

Results of Data Analysis

Measure	Pre Intervention (n=4258)	Post Intervention (n=3935)
Number of provider based Pediatric Asthma Visits	11,658	12,679
Number of patients who received ACT at each visit	4,248(36%)	6,790 (53.5%)
Percent of patients who had ACT scores 19 or above (indicative of well controlled asthma)	87%	89%
Number of patients who received an asthma action plan	327(8%)	259 (7%)
Number of patients identified with mild or moderate persistent asthma who were prescribed appropriate medications for diagnosis		1812 out of 1937 (93%)