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## Screening Tool within EMR Aimed at Identification of Pediatric Asthma as a Movement towards Accountable Patient Care

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Final DNP Project Report

Screening Tool within EMR Aimed at Identification of  
Pediatric Asthma as a  
Movement towards Accountable Patient Care

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University of Kentucky

College of Nursing

Fall 2016

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Debra Hampton, PhD - Committee Member

Pamela Johnson, MD - Clinical Mentor

## Dedication

To my mother, I feel you have watched over me from above.

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## **Abstract**

In this retrospective cohort study a screening tool aimed at identification of pediatric asthma based on patients' symptoms and directions for referral for PFT testing was placed in a Pediatric Practice site EMR in template form as a movement towards Accountable Patient Care. Twenty-eight pre-intervention patients and 5 post-intervention patients met criteria based on symptoms for referral to perform PFT testing to evaluate asthma as a diagnosis. These records were evaluated to see if PFT testing was performed, and if performed how it correlated with an asthma diagnosis. The screening tool had 100% identification of asthma as a diagnosis for those referred to PFT testing; however there were only 2 patients referred for this testing in the post-intervention cohort. There were no patients sent for PFT testing in the pre-intervention cohort.

Limitations to this study included no pre-intervention PFT testing for comparison and the small number of patients in the post-intervention cohort. Implications for practice are that structured guidelines within practice site EMRs have been shown according to evidence based literature to improve outcomes of quality which will be very important to the upcoming Accountable Care Models and hold promise to assist with meeting quality guidelines. More work should be performed to evaluate the effects of structured templates for diagnosing and treatment of chronic conditions such as asthma to assist with meeting guidelines and improving patient outcomes in the Accountable Patient Care Models

## **Screening Tool within EMR**

### **Introduction**

Childhood asthma is the most common chronic disease in infants and children, yet it can be difficult to diagnose. The reasons for the complexity of diagnosing asthma in pediatric patients are multifactorial and include a complex interaction among different variables. These variables include factors such as: pediatric patients are not able to always verbalize their symptoms, symptoms with asthma are variable over time and intensity, and guideline adherence for asthma and diffusion of evidence based guidelines are noted to be poor among providers. There appears to be a need to diagnose asthma early in pediatric because pediatric asthma untreated can result in damage to growing lungs (American Academy of Allergy, Asthma and Immunology, 2015).

An International Consensus on Pediatric Asthma (2012) defines asthma as a persistent inflammatory condition connected with variable airflow impediment and bronchial hyper-responsiveness that presents with recurring outbreaks of wheezing, cough, shortness of air and chest tightness'. This consensus panel states that to diagnose asthma, one must verify the presence of episodic symptoms of reversible airflow obstruction, and exclude other conditions. This panel recommends the evaluation of lung functioning by spirometry looking at reversibility to make the

diagnosis of asthma (International Consensus Pediatric Asthma, 2012).

This research looked at the role of guideline diffusion and implementation for pediatric asthma in relation to the busy provider in the Accountable Patient Care Model. This research utilized guidelines recommended by expert panels. A pediatric clinical site that became part of an Accountable Care Organization in 2016 with an electronic system that has template ability for placing guidelines was the setting for the study. In order to address these issues, guidelines and evidence based literature was reviewed in relation to pediatric asthma, diagnosis of pediatric asthma and template use for treatment and diagnosing pediatric asthma within an EMR.

The Global Initiative for Asthma (2015) has guidelines for making the diagnosis of pediatric asthma available for educational purposes to providers. This panel recommends referral to PFT testing if symptoms are present. Symptoms that this panel state are concerning for asthma in pediatrics are: wheezing, shortness of air, chest tightness and cough. Symptoms are variable over time and intensity, worsen at nights or upon waking, are triggered by exercise, laughter, allergens or cold, and can worsen with viral infections. If these symptoms are present, the Global Initiative for Asthma guidelines (2015) state it is necessary to look for evidence

of variable expiratory airflow limitation by PFT by looking at reversibility. PFT should show an increase by 12% or more after inhaling a bronchodilator in FEV1. This is called bronchodilator reversibility, which this site lists as the diagnosis tool for asthma.

The use of templates within the EMR was also reviewed in the literature, in order to address the issue of meeting quality guidelines for pediatric asthma.

There was not a plethora of research on this topic. Three studies, manuscripts were found that showed that structured guidelines within an EMR are associated with improvement in clinical quality guidelines for pediatric asthma patients. These studies, manuscripts will be presented individually to show each studies direct effect pertaining to template use with guideline improvement for pediatric asthma.

### **Manuscript 1**

Halterman et al. (2006) performed a randomized controlled trial in which 226 children with persistent asthma, aged 2-12, were seen for various reasons ranging from well child visits and acute care, and to asthma-related issues. The intervention involved randomly assigning children to a clinician prompt group in which the provider was prompted by the medical note in the medical record to ask specific questions related to asthma as a diagnosis.

The outcome measure was any asthma measure taken. The results showed that the children in the clinician prompt group were more likely to have preventative measures for asthma taken versus the non-prompt group (87% versus 69%). The researchers also found, more delivery of action plan in the prompt group (50% versus 24%), more discussion about asthma (87% versus 76%) and more recommendations for follow-up (54% versus 37%).

## **Manuscript 2**

Beck et al. (2012) conducted a retrospective review of EMR for asthmatic patients age 2-16 where before and after comparison of history and care plan documentation were assessed following an asthma specific template. Elements included in the review were: asthma severity classification and utilization history which included steroids, ER visits, ICU admissions, intubations, exposure to cockroaches, rodents and molds. The intervention was the asthma specific template. The outcomes were: templates resulted in severity classification (71% versus 44%;  $p < .001$ ), complete utilization history (73% versus 12%;  $p < .001$ ), environmental history (66% versus 2%;  $p < .0001$ ). Documentation among providers was noted to become more consistent over time and changes in care planning were found more after template implementation (63% versus 49%;  $p = .0006$ ).

### Manuscript 3

Bell et al. (2010) conducted a prospective cluster-randomized trial in 12 primary care sites over one year in which six practice sites had clinical decision support in the EMR and six did not. The participants were all children in the practice, age 0-18, with persistent asthma. The intervention was clinical decision support and charting in the EMR versus no clinical support and electronic charting mechanism in the EMR for pediatric asthma. The study authors found that using clinical decision support in an EMR showed a 6% increase in prescription controller medication ( $p=.006$ ), 3% greater use of spirometry ( $p=.04$ ) and improvements in the asthma care plan 14% ( $p=.03$ ).

The three studies presented (Haltermann, 2006, Beck, 2012 and Bell, 2010) showed that guidelines for treatment of pediatric asthma improved when placed in template form. The next step was to look at the EMR site and templates. The Practice Improvement site EMR is Office Practicum. This system has template ability. Research surrounding templates was reviewed and it showed that templates are structured documentation systems that can be targeted to specific diagnoses, such as asthma, and act as a means to remind busy clinicians to use evidence based medicine guidelines (Clark et al., 2012).

The Agency for Healthcare Research and Quality (2016) was also found to have developed a template to aid in the documentation of asthma symptoms as well as to improve adherence to recommendations for assessing asthmatic patients. The recommendations on this website also followed The Global Initiative for Asthma Guidelines (2015) for making a diagnosis of asthma.

Templates were found according to research, to assist Clinicians in the claims submission process. This will become important in the Accountable Care Models such as this practice site is joining, because Medicare and Medicaid are starting recovery programs on claims that are not following evidence based guidelines and evidence based guidelines are found to have increased when placed in template form (Sachdev et al., 2000). According to literature, templates should have core measure interpretation, allow one to map codes to the template and allow one to run quality reports over time (Garrido et al., 2014). This practice improvement site EMR was reviewed and met all of these criteria.

The purpose of this study was to evaluate if guidelines for diagnosing using both The Global Initiative for Asthma Guidelines and The Agency for Healthcare Quality and Research Guidelines for Pediatric Asthma placed within a practice site EMR along with

directions for ordering PFT testing would result in quality improvements in diagnosing pediatric asthma. Again, there is currently a small body of research available on this topic. The three studies presented above (Halterman, 2006, Beck, 2012 and Bell, 2010) showed significant improvement in quality outcomes when guidelines for asthma were placed in template form. This study looked at linking the current evidence found utilizing templates for meeting guidelines for asthma to using guidelines in template form for making a diagnosis of asthma.

The overall study objective was to identify patients who should be tested for asthma and utilize the standards that the expert panels recommend, PFT testing for making a diagnosis of asthma. The recommendations of the National Asthma Education Program indicate that Pulmonary Lung Function testing is essential in the diagnosis and management of asthma. (Crapo, 1994).

The National Asthma Education and Prevention Program 2014 lists Pulmonary Function testing on its website as “The test for diagnosis of asthma”. This site lists expert opinions from the American Academy of Pediatrics, 2014, the American Lung Association, 2014, the American Medical Association, 2014, and the National Heart Lung and Blood Institute, 2014 along with expert panels on the diagnosis and management of asthma. This site states that the definitive diagnosis of asthma requires a history

of symptoms listed by the Global Initiative for Asthma list combined and the demonstration of variable expiratory airflow obstruction by PFT testing to make the diagnosis (National Institutes of Health, 2014). The 2014 Asthma Expert Panel Guidelines for asthma state that in order to make a diagnosis of asthma the provider should include the thorough medical history with symptoms concerning for asthma; a full physical examination concentrating on the upper respiratory tract, chest and skin and PFT testing exhibiting an increase in FEV1 of 12% or greater after inhalation of a short-acting bronchodilator (National Institutes of Health, 2014).

## **Study Design and Methods**

### **Study Setting**

The setting for this study was a primary care pediatric setting located in a small town in Central Kentucky. This practice is part of a local hospital system and in December 2015 had 2010 active patients, age birth to 18 years of age. This Practice Improvement site became part of an Accountable Care Organization (ACO) in 2016. The main premise behind Accountable Care is to identify the most chronic conditions within a practice and perform evidence based medicine in order to improve patient outcomes and decrease costs for patients and the overall healthcare system (Fisher et al., 2006). In an ACO, the

burden of financial risk is borne by the facility, which results in a transfer of the risk to the clinicians providing care for the patients (Dunn, Lindsey, 2010). There are several core constituents of an ACO. This project examined the role of evidence-based guidelines for care management, which hold huge promise for assisting ACOs in achieving their two main objectives simultaneously: managing healthcare expenditures while preserving or improving care (Devore, S. & Champion W., 2011). In Pediatrics, asthma is the number one chronic condition with the highest burden of care (Models for Advancing Asthma Care, 2016). This is the reason the site chose asthma as their first diagnosis in the evaluation of quality guidelines within the EMR and its effect on pediatric asthma.

### **Intervention**

The goal at the onset of the project was to improve identification of pediatric asthma by utilizing the standard listed by expert panels, Pulmonary Function Testing to make this diagnosis. The intervention was an asthma screening tool placed within the EMR with asthma specific symptoms to assess along with directions for referral for PFT testing using the evidence based literature reviewed who agreed with symptoms that should be assessed for asthma. This project was undertaken as a movement towards Accountable Patient Care.

Evidence from a previous gap analysis review of the medical records of asthma patients at the project site showed a practice gap in recognizing patients who may need to be tested for asthma and utilizing Pulmonary Function Tests (PFT) for diagnosing asthma. From this earlier review, less than 30% of patients with a diagnosis of asthma within the EMR were diagnosed by PFT or a pulmonologist. This practice site was interested in starting with the identification of pediatric asthma and undertook a literature review. The Global Initiative for Asthma (2015) was found to have made guidelines for the diagnosis of pediatric asthma available for academic and educational purposes. The practice site wanted to start with these guidelines for the diagnosis of asthma and use a template form within the EMR to track that these quality guidelines were met. The site also provided teaching with providers and staff and The Global Initiative for Asthma guidelines were given to those in attendance. This meeting was held on March 8, 2016.

The Global Initiative for Asthma (2015) provides a logical method based on patient presentation of symptoms and a guide to evaluate pediatric asthma. These guidelines were placed within the EMR and education was given to the staff on how to screen and place patients within the EMR in the template based on patient presentation.

The staff were instructed as follows: The population of patients that are included in this study are pediatric patients age 6 to 18 years of age. Patients aged less than six were excluded because of concerns that they do not possess the dexterity to perform PFT testing by following direction. The study population consisted of patients age six or greater who presented with two or more of the following symptoms: cough, wheezing, chest pain with breathing or chest tightness. The patients who presented with two or more out of the four symptoms were placed in the cough/wheezing template set to map to diagnosis code cough, R05 (see cough template appendix).

This template that the provider utilized was the office note for the day and prompted the provider to ask the patient and parent the following questions, is the patient experiencing? Multiple episodes of symptoms over the last year, cough in relation to environmental factors (cold air, exposure to tobacco, wood burning stoves), cough with emotions, and cough with menstrual cycle or cough with exercise.

If parents/patients answered yes to the first question (multiple symptoms over the last year) and then yes to one or more of the other questions for children at or greater than six years of age, then the provider was to fully assess the patient and perform a physical examination paying particular attention to the upper

respiratory system, lungs and skin. The provider was then to order a Pulmonary Function test to assess whether the patient had asthma based on changes in pre and post bronchodilator pulmonary lung functioning, which is the current standard for diagnosing asthma.

The design was based on the Global Initiative for Asthma screening guideline for Asthma, 2015. The rationale for exclusion was also based on this guideline; so if the patient did not meet all the criteria (two out of the first four symptoms, then yes to the first question in the 2<sup>nd</sup> set and yes to one other) then that patient would not be sent for PFT testing for suspicion of asthma.

This project was undertaken by the facility as a Practice Improvement Project towards Patient Improvement in the Accountable Patient Care Act. This project began March 15, 2016 and ended June 21, 2016.

### **Evaluation**

The pre-intervention cohort was chosen from those presenting with a cough diagnosis from December 1, 2015 to March 1, 2016. This time frame was chosen because it correlated with ICD-10 coding to compare to post-intervention coding. The post-intervention cohort was chosen comparing the same code, cough R05, from March to June 2016. Symptoms were compared for needs for assessment of asthma by PFT and whether the provider sent the patient for evaluation for asthma by PFT testing.

The intervention and control cohort consisted of pediatric patients age 6-18 with two or more of the following symptoms: cough, wheezing, chest pain with breathing or chest tightness. The patients were to have reported multiple episodes of cough over the last year and at least one of the following: cough in relation to environmental factors, cough with emotions, cough with menstrual cycle or cough with exercise.

There were originally 327 patients in the pre-intervention cohort under diagnosis cough R05 for comparison to 64 in the post-intervention cohort for comparison of cough. We used exclusion criteria which were age and symptoms as listed above and there were 28 patient that met criteria in the pre-intervention cohort compared to five in the post-intervention cohort. There were no patients in the pre-intervention cohort sent for evaluation by PFT for suspicion of asthma. Sixteen of the patients in the pre-intervention cohort had a diagnosis of asthma in their medical records, but no PFT for the diagnosis was listed in their medical record. There was one patient in the post-intervention cohort with a previous diagnosis of asthma by a specialist; this patient was referred back to the specialist with their asthma exacerbation that was placed in the template Cough R05. There were two patients in the post-intervention cohort sent for PFT testing. Both patients

sent for PFT testing in the post-intervention cohort met criteria by PFT testing for diagnosis of asthma.

### **Statistical Analysis**

A retrospective cohort sample of 28 pre-intervention participants was compared to five post-intervention patients. This was the number of patients who met symptoms criteria for consideration of PFT testing to assess for asthma. The original intent of this study was to perform an independent t test and compare PFT testing scores between the pre-intervention cohort and the post-intervention cohort for asthma as a diagnosis (yes versus no). However, there was no variability in the samples and this test was not able to be performed. Descriptive statistics for the post-intervention cohort were assessed.

### **Results**

The pre-intervention cohort consisted of 28 patients, the time frame for this analysis was December 1, 2015 to March 1, 2016 there were 10 female patients and 18 male patients. These patients' ages ranged from 6 to 18. All patients were English speaking and Caucasian. There were 16 of these patients who had a diagnosis of asthma in their medical records. None of the 16 patients had PFT testing results in their medical records. The post-intervention group consisted of five patients, four males and one female. One of these patients had a previous diagnosis of asthma

in their medical record with no PFT results. The average age in both cohorts was 10. There were no patients in the pre-intervention cohort sent for PFT testing for evaluation for asthma to compare to the post-intervention cohort. There were 40%, or two out of five, patients who met symptom criteria who were referred correctly for PFT testing in the post-intervention cohort. There was 100% identification of asthma by this screening tool; both patients sent for evaluation of asthma by PFT testing met the criteria by PFT testing for asthma as a diagnosis. Both patients had a 12% or greater increase in FEV1 following bronchodilator during their PFT tests.

There were no patients in the pre-intervention cohort sent for PFT testing for evaluation for asthma to compare to the post-intervention cohort. There were 40% or two out of five patients who met symptom criteria who were referred correctly for PFT testing in the post-intervention cohort. One of the patients in the post-intervention cohort had a previous diagnosis of asthma and was referred back to a specialist with their exacerbation. There was 100% identification of asthma by this screening tool, both patients sent for evaluation of asthma by PFT testing met the criteria by PFT testing for asthma as a diagnosis. Test subject 37A in the post-intervention cohort was a seven year old male who had an increase of 14% following bronchodilator and test subject 46 A

in the post-intervention cohort was a 9 year old male who had a 12% increase in FEV1 following bronchodilator.

### **Discussion**

This study examined a screening tool aimed at identification of pediatric asthma within a practice site EMR as a movement towards Accountable Care. The screening tool utilized evidence based guidelines for referral to PFT testing for identification of pediatric asthma.

In the analysis there were 40% percent of the patients in the post-intervention cohort who met symptoms criteria for analysis of PFT for suspicion of asthma who were correctly sent for PFT testing. All of the patients sent for PFT testing by this screening tool met the criteria for diagnosis of asthma.

There were no patients in the pre-intervention cohort who had PFT testing performed. The post-intervention cohort had a larger number of patients who met criteria based on symptoms compared to pre-intervention numbers, and 16 out of the 28 patients had a diagnosis of asthma in their medical records. The time period for the pre-intervention December to March goes along with a time period when more viral symptoms occur.

However, due to the low volume of patients in post-intervention cohort and no comparison PFT in pre-intervention cohort this study would need to be evaluated on a larger scale for a

longer period of time to truly evaluate the results. Also a power analysis should have been performed prior to beginning the study in order to determine the number of patients needed to detect a statistical significance.

### **Implications for Practice**

Accountable Care Models stress the importance of following evidence based medicine guidelines, especially for the most chronic conditions such as asthma (Barr et al., 2003). The use of templates has been shown, according to the literature presented, to improve outcomes in quality of care. We must follow all guidelines for the best patient outcomes and this includes utilizing guidelines for diagnosis of disease states such as asthma (Doerschug, et al., 1999). The structured screening tool placed within this practice site utilized evidence based guidelines for the diagnosis of asthma.

Doctoral programs teach their graduates to “design, select, use and evaluate programs that assess and monitor outcomes of care, care systems, and quality improvement including consumer use of health care information systems.” (American Association of College of Nursing, 2006).

This study demonstrates the capability of nurses to assist with the upcoming models of care. The Doctorate of Nursing Practice curriculum includes coursework in healthcare finance,

healthcare technology, healthcare policy/law and healthcare quality that leads one to attempt to look at solutions to these forecasted challenges one can anticipate in the upcoming Accountable Care Models. This research employs techniques taught in the Doctoral Nursing curriculum to work with multi-disciplinary teams that includes disciplines such as Administration, Finance, Information Technology and Medical. This study would, however, need to be performed on a larger scale for a longer amount of time to assess its impact on quality improvement and finance in relation to pediatric asthma for this Accountable Care site.

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## Appendix

### Cough Template R05

Cough Template: map to code R05

Encounter Summary:

Patient Demographics Name:

Language:

Unknown Ethnicity:

Visit Information Date/time: Haggin Primary Care Pediatrics

Chief Complaint: cough, wheezing, chest pain with breathing or chest tightness

Number of findings:

ROS Findings Other: Additional Findings related to cough:

- \*1. Repeated episodes of cough over the last year
2. Cough worse at night or early in the morning
3. Cough in relation to environmental factors (cold air, exposure to tobacco, wood burning stoves)
4. Cough with emotions
5. Cough with menstrual cycle
6. Cough with exercise

Number of findings:

Exam Findings Gen. Appearance:

Head, Ears, Nose, Mouth, Throat: Normal Findings:

Neck:

Respiratory:

Skin:

Cardiovascular:

Gastrointestinal:

Assessment Cough: DX 1: R05 Cough

Plan:

Patient Instructions PFT, return to clinic for evaluation of PFT and treatment plan. Plan of care verbalized.

Coding/Audit Support Note started: 02/18/2016 08:31 AM HPI elements: None ROS categories: None Exam elements: None Counseling: Time not a key factor.