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A Quality Improvement Project on Diagnosis and Management of Asthma in a Private Pediatric Setting.

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Abstract

Background: Although national guidelines exist for the diagnosis and management of asthma, general practice differs significantly from recommendations. Quality improvement methodology when implemented can narrow quality gaps.

Objective: The objective of the project was to create and implement a plan of action to address identified gaps in key clinical activities of asthma care among pediatric population in a private pediatric setting in Northern California

Methods: The project was centered on the use of Education in Quality Improvement for Pediatric Practice (EQIPP), a program of the American Academy of the Pediatrics. Both the pediatrician and the DNP student took this course and employed its methods to improve asthma management. EQIPP supports providers in improving their practice with didactic materials that help participants develop quality improvement project and tools to evaluate the outcomes of that project.

Results: Based on the asthmatic patient data analysis the quality improvement team identified that the clinic lacks compliance in the following areas of national guidelines. a) Diagnosis of asthma, b) Asthma action plan and c) Asthma control and follow up. The team then developed and implemented an improvement plan based on EQIPP.

Conclusion: The quality improvement project enriched the pediatric practice management of asthma patients and similar projects could be implemented in other settings too.

Keywords: Asthma, EQIPP, guidelines, pediatric practice, diagnosis, asthma action plan, control

Background knowledge

Asthma is a chronic respiratory disease characterized by reversible periodic airway obstructions initiated by certain exposures, including environmental hazards. Childhood asthma is common in the Western world and under diagnosed in minority populations in Europe and the United States (USA). Minority populations are significantly burdened by asthma morbidity and suffer higher rates of emergency department visits, hospitalization, and even death (Wam, 2012).

Asthma affects an estimated 8.7% of USA children under 17 years and continues to be one of the most common childhood chronic illnesses. Uncontrolled asthma is associated with more school days missed among children, more work days missed among caregivers, and poorer quality of life among both. A special case of poor asthma control and nighttime awakenings from asthma, has been linked to school absences, lower school performance, and parents' lost workdays (Weinberg, 2009). The prevalence of childhood asthma in the United States increased from 9% in 2001 to 10% in 2011. This increased prevalence adds to the costs incurred by state Medicaid programs (Pearson et al., 2014).

To promote proper asthma management, the National Heart, Lung and Blood Institute (NHLBI) periodically produces guidelines that summarize current evidence and outline optimal management strategies. The guidelines emphasize the importance of using a collaborative approach between providers, parents, and children to develop an appropriate asthma management plan for the child. Following the development of the 2007 Expert Panel Report 3 (EPR-3), the NHLBI convened the Guidelines Implementation Panel to develop recommendations for accomplishing greater utilization of the guidelines. The Guidelines Implementation Panel report focused on 6 key messages from EPR-3: (a) the use of controller medications (e.g., inhaled corticosteroids) for persistent asthma; (b) written asthma action plans;

(c) standardized assessment of asthma severity using Spirometry; (d) standardized assessment of level of control; (e) scheduled periodic follow-up visits; and (f) control of asthma triggers (e.g., mold and other allergens). To encourage innovative programs for promoting these recommendations, the NHLBI also created the National Asthma Control Initiative (NACI) as a vehicle for funding demonstration projects that could explore best practices for disseminating these management strategies among patients, health care professionals, organizations, and leaders (NACI, 2013).

Clinical trials have demonstrated the effectiveness of guideline-based management in controlling pediatric asthma. Despite the proven efficacy of the National Heart, Lung, and Blood Institute asthma guidelines (NHLBI), adherence to these recommendations is unsatisfactory among primary care physicians (Lee & Le, 2012). A cross-sectional chart review of primary care pediatric offices found that only 34% of charts documented asthma severity. Similarly, only 52% of primary care physicians who treat pediatric asthma stated that they used spirometry in their practice and only 21% routinely used spirometry as recommended by the guidelines. Asthma education of patients during primary care visits actually decreased from 50% to 38% of asthma-related visits from 2001 to 2006 according to a national medical care survey. A study of communication skills of pediatric residents using unannounced, unobserved standardized patients found that only 55% of pediatric residents performed asthma teaching and only 44% performed inhaler teaching (Lee &Le, 2012).

Quality measures are tools that are used to evaluate healthcare processes, outcomes, patient perceptions, organizational structure, and systems and are linked with the ability to provide high-quality healthcare. Data on quality measures are reported in a variety of ways based on the type of care and provider. A number of federal agencies and non-profit

organizations have designed their own sets of standards for various purposes. In addition to assessing the quality of care delivered, quality measures are required for certification and accreditation programs, as a basis for incentive payments, as well as for quality improvement processes implemented by health care organizations (Thacker, 2015).

Quality improvement (QI) methodology, when implemented strongly can narrow quality gaps. Board-certified physicians looking for maintenance of certification (MOC) are now obligated to complete performance in practice activities, which involve practice-based implementation of QI principles. Education in Quality Improvement for Pediatric Practice (EQIPP) is one of such programs established by the American Academy of Pediatrics (Bundy et al, 2014). EQIPP participation can be used to satisfy continuing medical education (CME) and maintenance of certification (MOC) requirements. EQIPP is organized into clinical topic-specific modules each of which provides educational content on quality improvement methodology as well as topic-specific activities focused on potential gaps in care quality. In addition to the online content, participants conduct quality improvement work in their practices, including collecting performance data, trialing small-scale tests of change, and collecting follow-up data. EQIPP supports providers in improving their practice after comparing the baseline performance to national benchmark. After comparing the data providers can apply quality improvement principles learned through EQIPP in improving their practice. In today's changing healthcare environment, there is an increased emphasis on performance and a growing demand for accountability. To meet these challenges head on, proactive pediatricians are demonstrating their effectiveness in providing the best possible care for their patients through: (a) Measuring and assessing selected aspects of clinical care and comparing these with published guidelines, standards, and best practices; (b) applying QI principles to improve processes in their practice;

and (c) completing professional development requirements for maintaining their certificates of clinical competence. Since 2013, Academy of pediatrics has been encouraging pediatricians to do a quality improvement project among the asthmatic patients to prevent exacerbation (Bundy et al. 2014).

Local problem

As part of the Family Nurse Practitioner (FNP) curriculum, the DNP student has been precepted at a Northern California private pediatric clinic for clinical experience. The clinic caters to a diverse population of children and is busy throughout the day. The pediatrician in this clinic manages a high percentage of children with asthma. The pediatrician articulated that in spite of regular treatment and follow-ups some patients experience asthma exacerbation and end up being hospitalized, mostly during the winter season. When the DNP student discussed the new asthma guidelines and how its implementation has improved the control of asthma among children, the pediatrician at the clinic allowed the student to do an examination of clinic practice to implement change as needed to bring practice up to current clinical guidelines for best pediatric asthma management (S. Ashley, Personal communication, July 31, 2015).

Considering the advantage and feasibility of the program EQIPP, the pediatrician and the DNP student partnered and enrolled in the course on asthma so that they could bring a change at the pediatric clinic and also be aligned with national guidelines.

Intended improvement

The aim of the project was to create and implement a plan of action to address identified gaps in key clinical activities of asthma care among pediatric populations in a general pediatric setting situated in Northern California that serves approximately 600 patients aged from birth to

18 yrs. of age. The goal was to prevent asthma exacerbation for 90% of the children in the practice who were diagnosed with asthma through following the National Asthma Guideline. A clear diagnosis of asthma was necessary to ensure proper treatment. Clinicians should use key indicators when considering a diagnosis of asthma as noted in the National Heart, Lung, and Blood Institute (NHLBI) guidelines and support the diagnosis with physical examination, appropriate history, and spirometry (if 5 years or older) for 90% of all patients with asthma. Exclude all other diagnoses. At this clinic: (a) a clear diagnosis of asthma was not consistently established in accordance with NHLBI guidelines; (b) spirometry measurements were not taken or documented as recommended by the NHLBI guidelines; (c) a written asthma action plan was not provided or explained at every visit; and (d) patient self-management education and materials were not provided.

Review of the evidence

Clinical practice guidelines (CPGs) challenge to maximize the quality, efficiency, and cost-effectiveness of care delivered to patients by integrating evidence-based recommendations into daily management. Despite evidence-based guidelines being available for more than 20 years and concomitant research demonstrating improved outcomes associated with guideline adherence, health care providers do not consistently follow asthma guideline recommendations. In fact, available data continue to indicate less-than-optimal care for asthma in primary care (Elward. et.al, 2014).

In 2007, the National Asthma Educational and Prevention Program (NAEPP), coordinated by the National, Heart, Lung, and Blood Institute (NHLBI), released its third set of clinical practice guidelines for asthma. The Expert Panel Report 3(EPR-3) reflects the latest scientific advances in asthma drawn from a systematic review of the published medical literature

by an NAEPP-convened expert panel. It describes a range of generally accepted best-practice approaches for making clinical decisions about asthma care. The EPR-3 emphasizes the importance of asthma control and focuses on two domains—current impairment and future risk by which to assess asthma severity (for initiating therapy) and asthma control (for ongoing monitoring). EPR-3 also includes an expanded section on childhood asthma (with an additional age group), new guidance on medications, new recommendations on patient education in settings beyond the physician's office, and new advice for controlling environmental exposures that can cause asthma symptoms. Today, 23 million people in the United States have asthma, including seven million children under 18 years of age. More than half of these individuals had at least one asthma attack in the previous year. Asthma accounts for more than 10 million missed workdays and almost 13 million missed school days each year. Moreover, ethnic and racial disparities in asthma morbidity and mortality persist, as does the disproportionate burden of asthma on individuals who live in lower-income, inner-city environments. Implementing evidence-based clinical practice guidelines for asthma has demonstrated effectiveness. Yet, getting most clinicians to implement guidelines-based care for their patients with asthma and getting patients to adhere to their treatment plan remain a challenge (NIH, April 2010).

The Expert Panel agreed to specify the level of evidence used to justify the recommendations being made. Panel members only included ranking of evidence for recommendations they made based on the scientific literature in the current evidence review. They did not assign evidence rankings to recommendations pulled through from the EPR-2 1997 on topics that are still important to the diagnosis and management of asthma but for which there was little new published literature. Full Report 2007, the level of evidence is indicated in the text

in parentheses following first mention of the recommendation. The system used to describe the level of evidence is as follows (Jadad et al. 2000):

Evidence Category A: Randomized controlled trials (RCTs), rich body of data. Evidence is from end points of well-designed RCTs that provide a consistent pattern of findings in the population for which the recommendation is made. Category A requires substantial numbers of studies involving substantial numbers of participants.

Evidence Category B: RCTs, limited body of data. Evidence is from end points of intervention studies that include only a limited number of patients, post hoc or subgroup analysis of RCTs, or meta-analysis of RCTs. In general, category B pertains when few randomized trials exist; they are small in size, they were undertaken in a population that differs from the target population of the recommendation, or the results are somewhat inconsistent.

Evidence Category C: Nonrandomized trials and observational studies. Evidence is from outcomes of uncontrolled or nonrandomized trials or from observational studies.

Evidence Category D: Panel consensus judgment. This category is used only in cases where the provision of some guidance was deemed valuable, but the clinical literature addressing the subject was insufficient to justify placement in one of the other categories. The Panel consensus is based on clinical experience or knowledge that does not meet the criteria for categories A through C.

In addition to specifying the level of evidence supporting a recommendation, the Expert Panel agreed to indicate the strength of the recommendation. When a certain clinical practice "is recommended," this indicates a strong recommendation by the panel. When a certain clinical practice "should, or may, be considered," this indicates that the recommendation is less strong.

This distinction is an effort to address nuances of using evidence-ranking systems. For example, a recommendation for which clinical RCT data are not available (e.g., conducting a medical history for symptoms suggestive of asthma) may still be strongly supported by the Panel. Furthermore, the range of evidence that qualifies a definition of "B" or "C" is wide, and the Expert Panel considered this range and the potential implications of a recommendation as they decided how strongly the recommendation should be present.

Conceptual/ Theoretical Framework

Quality improvement (QI) involves using a recognized and methodical approach to continuous improvement. In a pediatric setting, the ultimate focus is on improving patient care, which aligns with the American Academy of Pediatrics' mission of promoting the health and well-being of infants, children, adolescents, and young adults. Several frameworks could be used to guide QI in clinical care. The Quality Improvement team decided to use the model for improvement described in "The Improvement Guide: A Practical Approach to Enhancing Organization Performance" (Lloyd, R.). The Model for Improvement provides a systematic approach for planning, testing, evaluating, and applying changes in processes and systems of care. It has been used extensively in healthcare and non–healthcare settings to implement process changes quickly and effectively.

This model has several benefits: (a) a valid and tested approach stemming from a scientific paradigm; (b) easy to use; (c) reduced risk by starting with small tests of change that can be tried out quickly; and (d) can be used to implement successful changes throughout the practice (Appendix A).

The model comprises two equally important parts:

Part 1 presents three fundamental questions that are essential for guiding improvement work:

1. What goals do the QI teams desire to accomplish? An organization's response to this question helps to clarify which improvements it should target and their desired results.

2. How will the QI team evaluate the change? Actual improvement can only be proven through measurement. An organization should think about how it wants things to be different when it has implemented a change and agree on what data needs to be collected for measuring. A measureable outcome that demonstrates movement toward the desired result is considered an improvement. For example, two outcomes for a QI might be showing how the service that patients receive will improve, or how an organization's processes might change.

3. What changes can QI team make that will result in improvement? Improvement occurs only when a change is implemented, but not all changes result in improvement. One way to identify which change will result in improvement is to test the change before implementing it.

Part 2 involves the Plan-Do-Study-Act (PDSA) cycle that tests and implements a change in real-work settings. The PDSA cycle is shorthand for testing a change by planning it, trying it, observing the results, and acting on what is learned. This is the scientific method used for action-oriented learning. The plan stage helps the clinic to answer the following

g questions: (a) which process needs improvement? (b) how much improvement is required? (c) what change should be implemented? (d) When should the change be implemented? (e) how should the effect of the change be measured? and (f) what does the change affect (such as, documents or procedures)?

Testing the change occurs during the do stage. The clinic tests the change and required measurements for the study stage then documents any problems and observations during the test.

An analysis of the data leads to the next stage, study. In the study stage, the clinic performs analysis of the data collected during the do stage and answers the following: Is the process improved? If improved, by how much? Is the objective for improvement met? Is the process more difficult using new methods? The responses derived from the study stage define the clinic tasks for the act stage. The clinic may choose to start again with a new test cycle based on the analysis and if the problem is unsolved, the clinic may return to the plan stage to consider new options.

Ethical Issues

The project was approved by FNP program of University of San Francisco as a practice improvement project and therefore exempt from Institutional Review Board (IRB). All the clinical activities incorporated into this project were standard clinical procedures and consistent with established clinical guidelines. All the patients and the parents were informed of the project plan and the goals of the project. The ancillary staff members also participated and fully cooperated with the project since they were involved in the project. Over all there were no major concerns for ethical issues and conflict of interest within the team. The pediatrician was motivated to bring a change in her practice and provided full support to the DNP student.

Setting

The pediatric clinic is situated in South San Jose in Northern California. A pediatrician who is part of a bigger group and also affiliated to two major hospitals in the area owns the clinic. The clinic caters to a diverse population of children and is busy throughout the time. The clinic has three ancillary staffs to support the pediatrician in her day-to-day activities. The clinic timings are from 9 am to 5 pm Monday to Friday and the off hours and weekends are covered by assigned on call pediatricians within the group. The pediatrician takes responsibilities for her

clinic and very much involved with the daily functioning of the clinic and has a good rapport with her patient population and their families. She has also conducted other studies in the clinic to improve the quality of care for her patient population. Amongst the patient population that she caters, 12% are diagnosed and treated for asthma.

Planning the intervention

The DNP student as the project leader took the responsibility for the entire project from the beginning to the end with the cooperation from the medical and non-medical staff members of the clinic. The planning for the project started from August 2015. The resources required for this project were American Academy of pediatrics ID numbers, computer to complete the mandatory course on QI Basics and contents on pediatric asthma. Also required were patient specific base line data after the chart review, medical record numbers of asthma patients and assistance from staff at the clinic. The DNP student and the pediatrician as QI team enrolled at EQIPP using their American Academy of Pediatrics ID number for the asthma QI project. After registration, the participants completed an online training on fundamentals of quality improvement (QI), known as QI Basics that is topic-specific to asthma. The clinical contents for the asthma module were evidence-based and known to be related to improving outcomes and agreeable to changes in practice. Once the online modules were completed, the DNP student performed a chart review to collect baseline and follow-up data of the asthma patients to evaluate the quality measures. The DNP student entered the patient specific data and compared it with the national asthma guideline. The data was analyzed to identify the gaps in quality and practice to select areas that needed improvement. Later the student met with the quality improvement team to develop an improvement plan based on the data analysis. The improvement plan was then utilized on asthmatic children to test the practice change using Plan, Do, Study and Act

(PDSA) cycle for 2 months. The findings of the new treatment plan and its effect on patients were analyzed twice to identify the outcome of the new improvement plan. This new data analysis helped the team to determine if change led to improvement or the plan needed further improvisation (Appendix B). The measurable objectives of the project were: (a) to use key indicators when considering a diagnosis of asthma and support the diagnosis with physical examination, appropriate history and spirometry (if ≥ 5 years) for 90% of all these patients; (b) to establish and document the current level of asthma control among 90% of all patients ≥4 years of age at every visit by using a validated asthma control tool and also identify and document reason(s) for lack of control if "not well controlled" or "very poorly controlled"; and (c) to provide a written asthma action plan to 90% of all asthma patients at the time of the initial diagnosis and keep updating and reviewing the plan as needed with the patient and/or family at every visit.

Implementation of the project

The project was centered on EQIPP course, that required both online and offline work. Both the pediatrician and the student did the online part of the project together so that they could discuss the current practice at the clinic in comparison to national guidelines. As we moved on with online course, we learned that the clinic is lacking most of the elements suggested in the national asthma guidelines. After completing the online part of the course, the student entered the relevant data from the patient chart to the data collection tool provided by EQIPP (Appendix C). According to the chart review, the student identified 60 asthmatic patients who are regularly following up with the pediatrician. Among the 60 patients we chose 24 patients for the project since they had history of asthma exacerbation in the past. Entered baseline data for twenty-four patients from the data collection tool at the EQIPP website for establishing a baseline to measure

the current level of care in key clinical activities and then to identify gaps. For the details of the analysis refer to Appendix D. Based on the data analysis and the gaps identified, the QI team decided to focus on: (a) diagnosis; (b) asthma action plan; and (c) asthma control and follow up. Using the EQIPP improvement sheet the QI team developed a plan to bring changes to these areas of practice (Appendix E).

1. Diagnosis: The main aim was to use key indicators when considering a diagnosis of asthma and support the diagnosis with physical examination, appropriate history and spirometry (if ≥ 5 years) for 90% of all these patients. To achieve this aim the team carried out the following steps among 24 asthmatic patients: (a) key indicators were used for considering the diagnosis of asthma as noted in Box 3-1 of the NHLBI guidelines (Appendix F); (b) a structured medical history questionnaire as part of physical examination to help establish the diagnosis was implemented as in Figure 3-7 of the NHLBI guidelines (Appendix G); and (c) spirometry was performed when key indicators were present to demonstrate obstruction and assess airflow reversibility. Asthma Predictive Index (API) that outlines the major and minor criteria to identify children at future risk for developing persistent asthma was used for children under 5 years of age with wheezing.

2. Asthma control and follow up: The main aim was to establish and document the current level of asthma control among 90% of all patients ≥4 years of age at every visit by using a validated asthma control tool and also identify and document reason(s) for lack of control if "not well controlled" or "very poorly controlled". The aim for asthma control and follow-up was achieved by introducing sample patient self-assessment form at the clinic for follows up visit (fig. 3-9) for all the asthma patients. (Appendix H).

3. Asthma Action plan: The main aim was to provide a written asthma action plan to 90% of all asthma patients at the time of the initial diagnosis and keep updating and reviewing the plan as needed with the patient and/or family at every visit. An asthma action plan was developed for the clinic, which included the following instructions (Appendix I): (a) list of daily medications to be taken; (b) actions to take control of environmental factors that may worsen the asthma; (c) to recognize and handle worsening asthma by identifying signs and symptoms such as increased wheezing, shortness of breath, nighttime awakenings, etc.; (d) list of medications to be taken in response to signs of worsening asthma; (e) describe symptoms that require urgent medical care; and (f) list appropriate phone numbers for emergency contacts such as physician, emergency department and ambulance service. The medical assistants were also trained and educated to perform a peak expiratory flow meter on patients and to review the action plan with the patient and family at each follow up visit and document it in the chart.

Planning the study of intervention

During the clinical rotation for her FNP program the student observed that the pediatrician was not following the national guidelines in treating asthma patients and brought it to the pediatrician's attention. The pediatrician treated all the patients who came with wheezing as asthmatic without consistently following the national guidelines. As the student discussed the national asthma guidelines, the pediatrician was motivated to conduct a quality improvement project using the EQIPP course since she was familiar with this program and in collaboration with the pediatrician and the other auxiliary staff members at the clinic the DNP student assumed the role of team leader for this project. The student prepared a time frame for the project so that the project could be completed by February 2016. The planned time period was: (a) September 2015- planned and registered for the course at EQIPP website; (b) October 2015 - did the

required education module on Asthma and QI basics, collected base line data of asthma patients from the medical record; (c) November 2015 - analyzed data, identified the gap in quality and practice and developed an improvement plan for the clinic; (d) December 2015 to January 2016 - implemented the plan using the PDSA cycle; and (e) February 2016: collected and analyzed the follow up data to determine if change led to improvement (Appendix J).

For the asthma QI project, the DNP student and the pediatrician as QI team enrolled at EQIPP using their American Academy of Pediatrics ID. After registration, the QI team completed an online training on fundamentals of quality improvement (QI) known as QI Basics that is topic-specific to asthma. The clinical contents for the asthma module is evidence-based and known to be related to improving outcomes and agreeable to changes in practice. As the team moved on with the online part of the EQIPP, they also compared the clinic practice with the training module and learned that the clinic was lacking compliance with the national guidelines. After the online educational program, the student with help from the office staff identified the asthma patients who regularly followed up with the pediatrician. Once these patients were identified through the chart review the pediatrician contacted the patient's family about the project plan and obtained a verbal consent, which is documented in the patient's chart. The student compared the medical record documentation of each asthmatic patient with the asthma guideline and entered the required baseline data using the data collection tool provided through EQIPP. The QI team later entered these baseline data at the EQIPP site to analyze results to identify gaps in key clinical activities. As revealed in Appendix D, the analysis emphasized that the practice had quality gaps in: (a) asthma action plan at 90%; (b) asthma control and follow up using validated tool at 90%; and (c) establish diagnosis with spirometry at 80%. Subsequently

the QI team met together and decided to address these gaps. The team decided to generate an improvement project to advance care through Plan, Do, Study, and Act (PDSA) cycles.

Methods of evaluation

The QI team recurrently met and brainstormed to move forward with the improvement project, which was based on "Model for Improvement". The model comprises two equally important parts. Part 1 covers three fundamental questions that are essential for guiding work improvement: (a) what goals do the QI team desire to accomplish? (b) how will the QI team evaluate the change? and (c) what changes can QI team make that will result in improvement?

Based on the model Part 1 component, the team developed an aim statement and processes to accomplish these goals for each quality gap identified centered on the NHLBI guideline as explained above. To begin with the change in practice: (a) the pediatrician purchased portable spirometry equipment to ensure that pulmonary function test was done on all of her asthmatic patients to confirm diagnosis; and (b) the team planned to introduce an asthma action plan for the patients based on peak flow readings and symptoms and congruently purchased peak flow meter for the clinic. Meanwhile the student made copies of: (a) key indicators to aid in diagnosing asthma as mentioned in appendix F; and (b) the API for children less than five years and patient self-assessment sheet for follow up (Appendix H). All of these forms were attached to the respective patient's medical file. The pediatrician herself preferred to do spirometry on all of her patients and trained the medical assistant to perform peak flow meter to implement asthma action plan for the patients. During the process of planning change in practice there was a full cooperation and good communication among the team.

Part 2 of the model involves the Plan-Do-Study-Act (PDSA) cycle that tests and implements a change in real-work settings. Based on the above plan the Do and study stage of

the project was done from December 2015 till the end of January 2016. The office staff members scheduled appointments for 24 of the selected asthmatic patients so that the plan could be implemented. Among 24 patients 5 of them were below 5 years and could not perform spirometry and introduced API measures. Few of the parents did not keep up with the appointments and some of the parents were not interested in performing spirometry for their child and the pediatrician had to spend a lot of time in educating the importance of spirometry in asthma diagnosis. The pediatrician was mainly responsible for the do stage of the project while the student coordinated the processes and collected the data for analysis through chart review and the office staff. Over all the team did not face any hindrance in planning and implementing the project at the clinic practice.

Analysis

Analysis of the data led to the study stage of the model. In the Study stage the team performed analysis of the data collected during the do stage and answered the following questions: Is the process improved? If improved, by how much? Is the aim for improvement met? And is the process more difficult using new methods?

The student entered the data for 24 patients at the EQIPP website using the data tool provided (Appendix C). The analysis of the data revealed that the practice still had a quality gap of 50% in using the validated tool for asthma control and follow up. There was 100% compliance with asthma action plan and in obtaining spirometry measurement. Other outcomes of the analysis were: (a) it was observed that none of these 24 patients had an urgent care clinic or emergency room visit due to asthma exacerbation during the implementation phase; (b) the spirometry test revealed that two of the patients had restrictive lung disorder and the pediatrician referred these patients to a pulmonologist for further evaluation; (c) 40% of the parents were

reluctant to buy peak flow meter for their child; and (d) the children above 16 yrs. were compliant in using the flow meter in comparison to other age group. The QI team met and revised the analysis outcomes to proceed with the Act stage of the model. The team concluded that the clinic should bring the following changes to its practice: The pediatrician would (a) continue using the key indicators in diagnosing asthma, (b) perform spirometry annually to monitor the lung function and use API for children less than 5 years, (c) implement asthma action plan for all the patients and the medical assistant will be responsible to review the action plan with the patient during the follow up visit, and (d) to present patient self-assessment sheet during follow up visit to monitor asthma control. The software EQIPP was used for analysis of the data and also creates an improvement plan.

Program Evaluation/Outcomes

The quality improvement project was done in a private pediatric clinic owned by the pediatrician. There are three staff members to assist the pediatrician in the day-to-day activities. The pediatrician was motivated to bring a change to her practice in managing the asthma patients and gave the DNP student enough freedom in planning and implementing the project. There was complete cooperation within the team that led to the successful implementation of the program. The project was done using the EQIPP course flow so the team followed their guideline which was based on “The Improvement Guide: A Practical Approach to Enhancing Organization Performance" (Lloyd, R.). The highlight of the project was that the clinic did not practice national asthma guideline in treating and diagnosing asthma among children before planning the improvement project. Following the implementation of the project at the clinic, the team decided to adopt the national guidelines in treating asthma patients. Other specific outcomes of the program were: (a) the pediatrician mentioned that the online learning content of the EQIPP

helped to increase her knowledge of understanding asthma management; (b) during the implementation phase the team also learned that successful compliance of the asthma action plan was a team effort which included the patient, parent and the treatment team. In some cases, the peak flow meter use was not welcomed by parents since they viewed it as extra effort; (c) the accuracy of the spirometry readings can fluctuate depending on the patient's age and understanding; (d) the ancillary staff forgot to provide patients with self-assessment sheet for follow up visit and some patients forgot to complete the form; and (e) the new clinic practice increased the work flow for the ancillary staffs and the pediatrician.

The positive attitude and hardworking nature of the team at the pediatric clinic enhanced the smooth implementation of the project. The determination of the team to bring a change in quality of care rendered to their patients was also an additional strength in executing the change in practice.

Summary

The asthma guidelines are not intended as a substitute for sound clinical judgment and the individualization of patient care, but instead they are designed to foster evidence-based decision-making and to accelerate the application and execution of advances in patient care to everyday clinical practice. This quality improvement project conducted in a small pediatric clinic highlighted that the clinic was non-compliant with national asthma guideline in diagnosing and treating the pediatric asthma patients. The interaction between the pediatrician and the DNP student provided an open door for the student to suggest implications of the new guidelines and also plan and implement the project. Subsequent to the findings of the project, the clinic was determined to bring changes in the following areas of asthma care: (a) the pediatrician would use the key indicators in diagnosing asthma; (b) perform spirometry along with key indicators in

diagnosing asthma and also implement annual spirometry on all asthmatic patients to monitor the lung function; (c) execution of API for children under 5 years with wheezing to predict future risk of developing persistent asthma; (d) implement asthma action plan for all asthma patients and the medical assistant will be responsible to review the action plan with the patient during follow up visits; and (e) to introduce patient self-assessment sheet during follow up visit to monitor asthma control.

Relation to other evidence

This project demonstrated that there was improvement in the physician's performance in all the key interventions recommended in the EPR-3 guidelines. Online educational programs such as EQIPP hold promise for front-line clinicians to learn QI which can lead to meaningful advances in both the quality of asthma care provided and adherence to national guidelines.

A literature search was done using the key words "clinical guidelines" " -pediatric asthma-", "-primary care adherence-", "-pediatricians' knowledge and attitude"-"primary care providers-", "physicians", "treatment," and "diagnosis". Studies were identified in PubMed, Medscape, Research gate, EBSCO and the Cochrane Library. Literature was mined to determine the reasons for the high number of pediatric asthma exacerbations nationwide. Data from available journal literatures were systematically reviewed and pooled to evaluate the adherence of national asthma guideline among primary care providers. In addition, the literature reviews also analyzed the primary care provider's knowledge about childhood asthma, and their knowledge and attitudes about national asthma guidelines. Data was organized and synthesized around the themes mentioned in the National Asthma Guidelines.

1. Outpatient management of pediatric patient with asthma: The National Heart, Lung and Blood Institute (NHLBI) (2007) guidelines provide several recommendations for proper asthma management to minimize uncontrolled asthma. These guidelines include: use of pharmacologic therapy, patient education, reduce environmental triggers and assess and monitor asthma control. The guidelines emphasize the importance of using a collaborative approach between providers; parents and children to develop an appropriate asthma management plan for the child.

However, Betsy et al. (2011), found in five large primary care pediatric practices in nonurban areas of North Carolina that these guidelines are not being met. Providers discussed the frequency of use, supply of medication, and strength/dose of medication with families most often, but they only discussed the purpose of the control medication during about one third of all visits and emphasized best outcomes with consistent medication use during about a quarter of all visits. Providers rarely discussed side effects and fears/concerns about control medications. This study also highlighted that, most hospitalizations for asthma attacks were found to be preventable had medications been taken regularly.

2. Primary care provider knowledge and attitude: Current national asthma guidelines emphasize Spirometry testing for the diagnosis of asthma because clinical history and physical examination findings alone are not reliable for this purpose. Spirometry is the accepted standard for asthma diagnosis and monitoring and is also the most widely performed pulmonary diagnostic test in school children, adolescents, and adults for respiratory disorders.

Dombkowski et al (2010), found that the lower use of Spirometry in primary-care settings in children with asthma does not conform to the national guidelines. Implementing those guidelines will probably require a major educational initiative to address deficiencies in

Spirometry interpretation. This study highlighted that pediatric primary care physicians use Spirometry in their clinical practices to a more limited degree than do family physicians.

Roberts et al. (2013) in their study on Improving Pediatrician Knowledge about Environmental Triggers of Asthma highlights that achieving quality care for asthma patients requires the dissemination of all components of the evidence-based NHLBI guidelines into clinical practice. Despite the strong evidence base for environmental management of asthma, the study found that few pediatric trainees or general pediatricians have sufficient knowledge of this topic. The study also indicated that using a standardized in-person training module improved this knowledge gap and suggests that its translation into practice can be improved.

Lee and Le (2013) in their study on training pediatricians to adhere to asthma guidelines emphasized that despite the proven efficacy of the National Heart, Lung and Blood Institute asthma guidelines, adherence to these recommendations is suboptimal among primary care physicians. Knowledge, skills and attitudes among pediatricians influenced adherence to the asthma guidelines. Workshop-based provider education interventions demonstrated short-term improvement in knowledge, but do not lead to long-term changes in patient outcomes. Comprehensive quality improvement interventions that integrate education and process changes yielded the best results in improving asthma care in children

3. Use of Asthma Action Plan: An asthma action plan (AAP) is a document designed to support patients with self-management of their chronic disease. In fact, guidelines from the National Heart, Lung and Blood Institute (NHLBI) recommend that all patients with asthma be provided with a plan that includes instructions for daily management and how to recognize and handle worsening symptoms. AAPs are predominantly helpful for patients with moderate or severe persistent asthma, a history of severe exacerbations or poorly controlled asthma. While

the content of each AAP may vary to some extent, typical plans outline which medications and what actions to take in the following three zones: (a) the “green zone”, medications taken every day to achieve and maintain good control; (b) the “yellow zone”, rescue medications to add when asthma gets worse and when to see their provider for follow-up; and (c) the “red zone”, medications to take and how to seek care in the event of an asthma emergency.

Evans et.al. (2010), showed that patients receiving an AAP as part of their self-management education have higher satisfaction with their care, increased medication adherence, and fewer acute care visits compared with patients with no AAP. A Cochrane review of 36 studies showed significant reductions in both ED visits and hospitalizations among patients with an AAP as part of optimal self-management compared with usual care.

Kuhn et al. (2015) demonstrated that on integration of an Asthma Action Plan into an electronic health record (eAAP) in the outpatient setting of a large health care system significantly reduced asthma exacerbation and related outcomes, such as oral steroid use among children but not adults. The majority of plans (82%) were created for children and this higher portion of pediatric recipients was an expected finding because it is customary for schools to request or require a copy of the AAP for their records, where it is used as an order for medication administration during exacerbations. This eAAP not only satisfies the traditional elements of basic AAPs but also leverages technology to improve the efficiency of care delivery and adherence to evidence-based guidelines with decision support capabilities to improve asthma control. Furthermore, because this eAAP is embedded in the EHR, workflow is optimized for busy providers, and continuity of care is achieved across the health care system (p.390). Please refer the evidence table that was generated based on AHRQ evidence grading tool (Appendix L).

Discussion

The above literature reviews highlight that a gap existed between the information contained in published guidelines and the care providers' knowledge and information essential to execute them (Appendix M). The major gaps identified were:

1. Diagnostic measures, assessment & monitoring: Although some providers are aware of the NHLBI guidelines, they are not always implemented during patient care. Spirometry is the accepted standard for asthma diagnosis and monitoring and is also a widely performed pulmonary diagnostic test in school children, adolescents and adults for respiratory disorders. Spirometry measures and other analytic tools are not always used as the guidelines recommends.

2. Control of environmental factors contributing to asthma severity: Exposure to allergens and irritants such as tobacco smoke, dust mites, animal dander, cockroaches and mold trigger increases respiratory symptoms in asthma patients. Control of environmental factors and need for proper medication is essential in reducing inflammation and respiratory symptoms. Despite the strong evidence base for environmental management of asthma very little education about allergen control and testing for potential allergens are provided at the health care provider's visit.

3. Asthma Action Plan: Asthma action plans are an integral part of the asthma care paradigm, but pediatricians do not implement it at their practice due to time constraints. Adherence to asthma guidelines is poor in part because of the complexity of NHLBI guidelines. The most recent version of the NHLBI's asthma guidelines is 440 pages long and requires providers to recall variations in the recommendations that are dependent on patient age, severity or level of control and therapy step to tailor medication selection. The complexities and intricacies of asthma management require innovative approaches to improve quality gaps and

patient outcomes. Technology can be leveraged to link and filter the guidelines to providers at the point of care, resulting in increased adherence and reduced exacerbations. By incorporating technology into providers' asthma workflow, these solutions may increase the likelihood of patients receiving guideline-based recommendations and an AAP, thus facilitating their active involvement in their own asthma care.

The student observed that the above literature findings were true at this pediatric clinic however; the pediatrician was open for discussion with the student and decided to bring a change to her practice. The burden of pediatric asthma continues to be a significant problem due to the challenges primary care pediatricians face in implementing asthma guidelines. But this project proved that online learning programs like EQIPP can bring a change in providers' behavior by increasing their knowledge, skill, and self-efficacy in related subject matters.

Barriers to implementation/Limitation

Suspected barriers to implementing appropriate asthma care at the clinic were: 1. Lack of adherence to provider recommendations by the patients and their families due to: (a) multiple medications with recurrent dosing; (b) complex route of administration (inhalers); (c) ill effects of medications (hyperactivity, dry mouth, thrush and rapid heart rate); (d) expenses due to equipment, medications and doctor's visits; and (e) insufficient environmental controls in the home. 2. Psychosocial and economic factors such as: (a) low income causing inability to buy medicine, equipment; (b) lack of resources such as child care, requiring a sick child to go to school; (c) failure to diminish triggers in the home due to financial or educational constraints; (d) low self-esteem causing lack of motivation in disease management; (e) Poor coping mechanisms leading to poor adherence to treatment regimen; and (f) time constraints for provider and the

team. The QI team did not experience any of these barriers during the two months' period of implementation except statements from some parents that the new treatment would require more effort from their side. The long-term effect is unpredictable.

Interpretation

The quality improvement project was conducted with the full corporation from the clinic team. The pediatrician explained to her staff members, the objectives of the project and the student's role at the clinic during the PDSA cycle of the project. The pediatrician agreed to bear the cost that would require for the change of practice in asthma care at the clinic. The improvement project was done through EQIPP course flow (Appendix B) and the team followed the course direction. The pediatrician and the student finished the online part of the course together, which facilitated the team to deliberate the current practice at the clinic. The team acknowledged that the online part of the course enriched their knowledge on asthma diagnosis and management and furthermore inspired them to implement those guidelines so that the quality of patient care was compliant with national standards. The team experienced cohesiveness among its members as they moved on to the offline part of the EQIPP course flow, which included chart review, data analysis, development of improvement sheet and test cycle. Some of the highlights of the chart analysis other than the data collected using the data tool provided were: (a) followed up with four asthmatic patients who had not taken annual flu vaccine; (b) the chart contained patients' school details both academic and nonacademic; and (c) the provider documented the details of the patient education after each encounter.

In spite of the meticulous preparation, it was found during the test cycle of the project that the staff members forgot to introduce the patient self-assessment sheet during follow up visit to assess asthma control. The parents were concerned that introduction of asthma plan with peak

flow meter and the self-assessment sheets increased their responsibility and cost. The team spent a lot of time in educating these parents about the importance of these measures and its influence in controlling the asthma in their children.

During the Act stage of the study the student made an action plan for the clinic indicating the changes that would be implemented for asthma care and who is responsible for each of those steps. The pediatrician was responsible for including the key indicators, asthma performance index, performing initial spirometry and initiating asthma plan. The medical assistant was responsible for patients completing self-assessment sheet to monitor asthma control, reviewing the asthma action plan and annual scheduling of spirometry. The post implementation of the data analysis showed a quality gap in asthma control and follow up at 50% (Appendix K).

The total cost for this project was $1690/- refer Appendix N for details. The pediatrician earned her Continuing Medical Education and Maintenance of Certification for her clinic because the team used EQIPP for this project

Conclusion

Although national guidelines exist for the diagnosis and management of asthma, private practice varies significantly from recommendations. The Institute of Medicine defines health care quality as "the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge" (IOM, 2001). Founded on the above definition, quality measures relate to populations which include rates that indicate how many members of a population achieved a goal such as the prevention of asthma exacerbation and emergency room visits. But the guidelines for individual patient care advocates that clinicians contribute to improve the care that they deliver to their patients with a specific disease or condition. Keeping the above information in mind the QI team

decided to conduct the quality improvement project at the pediatric clinic to bring a change in asthma care. The team through EQIPP identified the guidelines that needed to be adopted to achieve the quality measures for the clinic. During the two-month period of implementation it was observed that the patients who were in the study did not have an asthma exacerbation. Therefore, the team recognized that quality improvement project enriched the pediatric practice management of asthma patients.

An implication for the advance nursing practice is that quality improvement projects can bring a change in practice. It improves clinicians' knowledge as well as the quality of care rendered to the patients. The change of practice in small clinics can contribute much to the outcomes in asthma care at the national level.

The recommendations for future studies are: (a) the long-term effect of this improvement project should be evaluated after a minimum period of one year. This could be taken up as a future study since PDSA cycle is an ongoing process; (b) a similar kind of study can also be conducted in a family practice setting; (c) the study should also be conducted for children at different age groups; (d) a quality improvement project could be conducted specifically to identify and control asthma exacerbation through monitoring environmental factors; (e) a project could also be conducted regarding provider's compliance in initiating a stepwise asthma treatment among asthmatic patients; and (f) a study on patients' compliance in following the provider's guideline and the obstacles encountered would help in modifying the future guidelines for asthma care.

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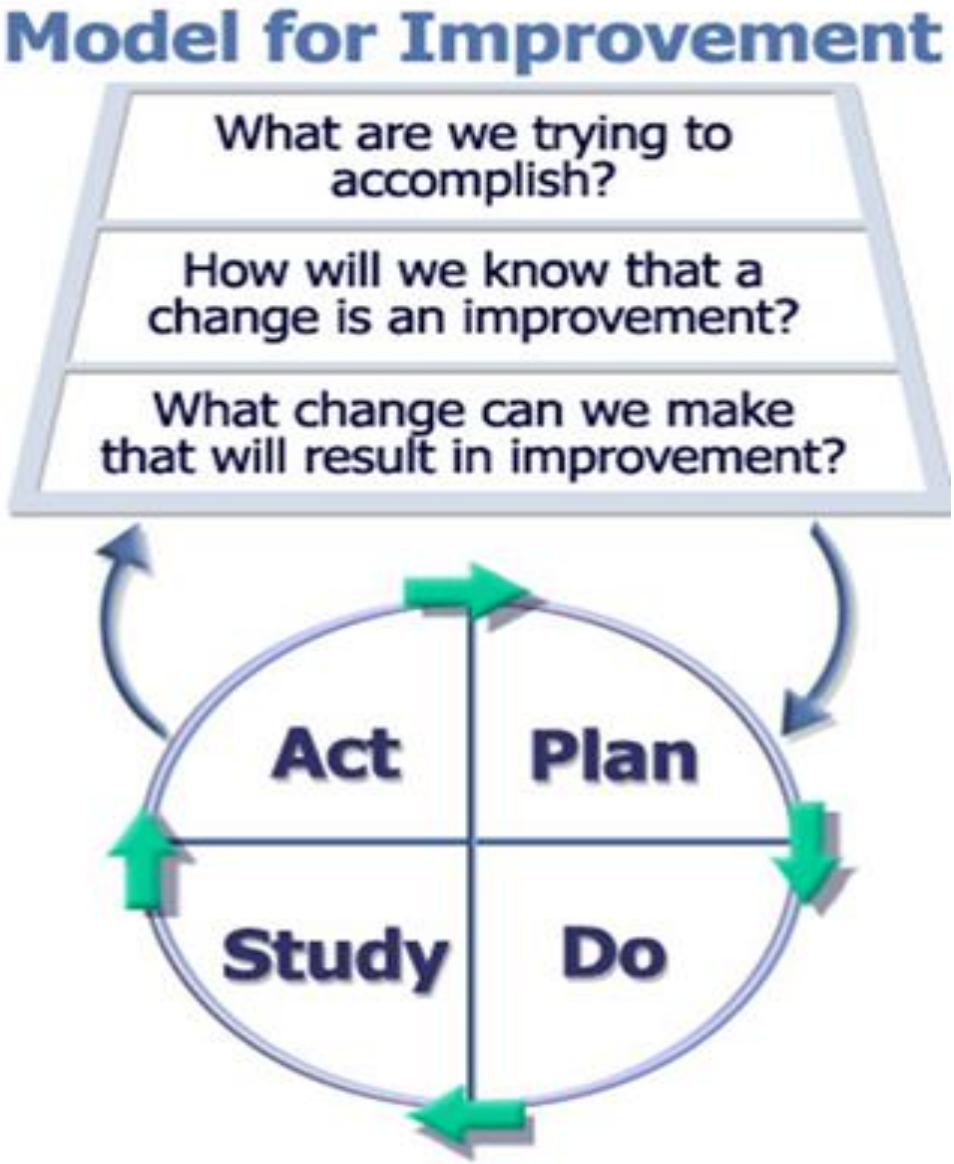
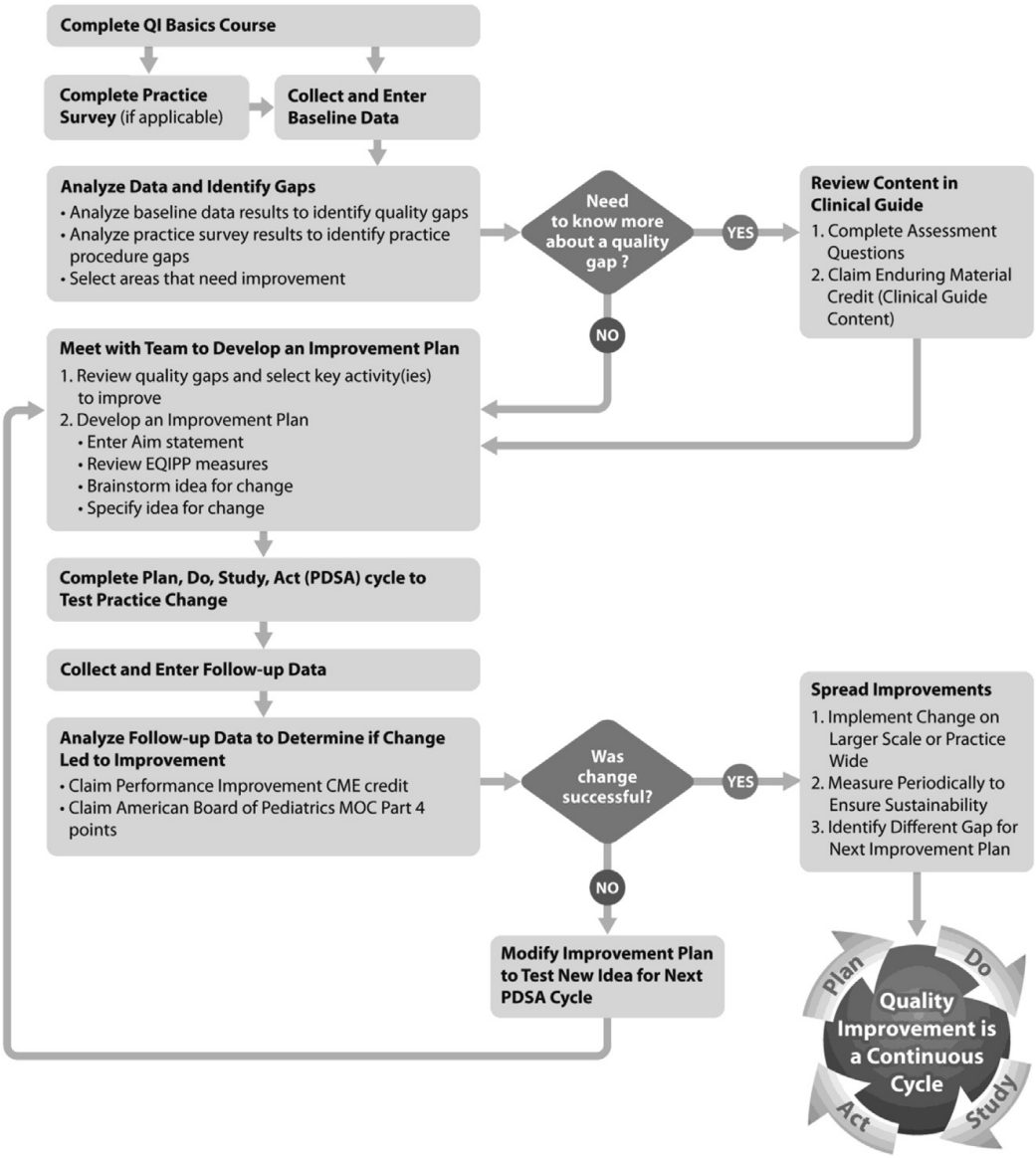
Appendix A


Model for Improvement
What are we trying to accomplish?
How will we know that a change is an improvement?
What change can we make that will result in improvement?
Act
Plan
Study
Do

Appendix B

EQIPP Course Flow



Appendix C

Generalist Data Collection Tool

Patient name: _____Age of patient: __ years __ months

Purpose of visit: ☐ Well visit ☐ Asthma visit ☐ Other sick visit

Note: EQIPP does not record any patient identifying information. You may enter it here on the printed copy of the data collection tool for your own record-keeping purposes, for example, to attach to the patient chart.

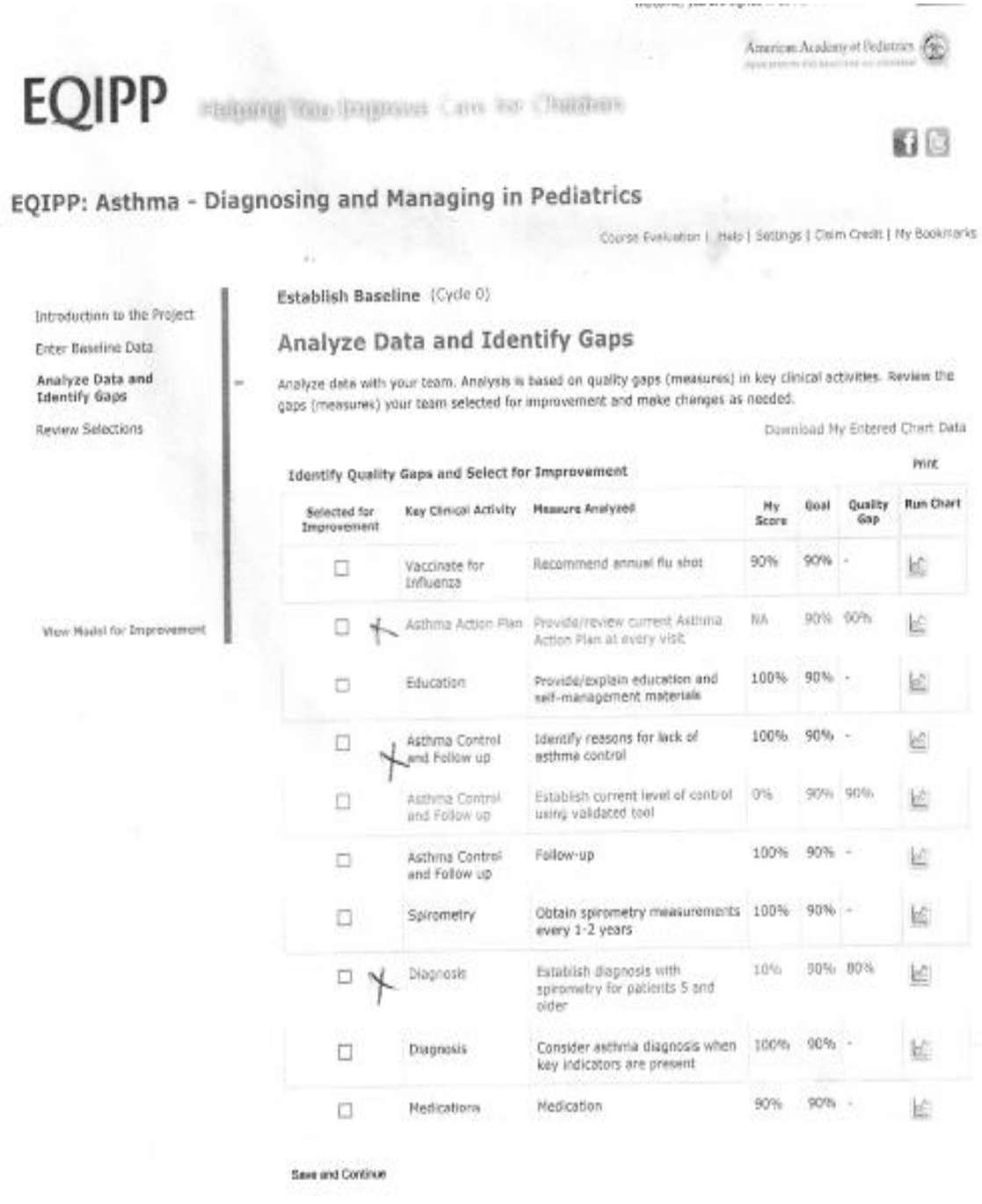
Directions: Use this data collection tool for the next 10 to 20 patients seen in your office for treatment of asthma.

1. Were one or more asthma key indicators present when considering the diagnosis of asthma?
   O Yes O No O Not documented
2. Were lung function measures by spirometry used to establish the asthma diagnosis?
   O Yes O No O Age inappropriate, younger than 5 years
3. Was a validated instrument used to determine the current level of asthma control?
   O Yes O No O Not documented
4. What is the current level of control documented in the patient's chart? (Click to review the National Heart, Lung, and Blood Institute [NHLBI] Expert Panel Report 3 [EPR-3] control tables.)
   ☐ Well controlled
   ☐ Not well controlled
   ☐ Very poorly controlled
   ☐ Not documented

   If "not well controlled" or "very poorly controlled":
   5. Does the chart identify reason(s) for lack of control? (Examples: exposure to allergens, tobacco smoke, indoor or outdoor pollutants and irritants, nonadherence to medication regimen)
      O Yes O No O Not documented
6. Is spirometry currently scheduled to be tested, or have results been obtained within the last 1 or 2 years?
   O Yes O No O Age inappropriate, younger than 5 years O Not documented
7. Was the age-appropriate NHLBI EPR-3 stepwise table used to identify treatment options or to adjust therapy based on asthma control?
   O Yes O No O Not documented
8. Has a flu shot been administered or a recommendation made within the past 12 months?
   O Yes O No O Patient younger than 6 months, other contraindications, or vaccine unavailable O Not documented
9. Does the patient have a written asthma action plan?
   O Yes O No O Not documented

   If yes:
   10. Was the plan updated as needed and reviewed with the patient and/or family at this visit?
      O Yes O No O Not documented
11. Were asthma self-management education and materials (other than or in addition to the asthma action plan) provided and explained to the patient and family at any visit? (Examples include correct medication techniques, avoiding environmental triggers, and getting help to quit smoking. See Figure 3–13, Delivery of Asthma Education by Clinicians During Patient Care Visits for more information.)
    O Yes O No O Not documented
12. Was a follow-up appointment recommended to monitor asthma control?
    O Yes O No O Not documented

Appendix D



American Academy of Pediatrics

EQIPP

EQIPP: Asthma - Diagnosing and Managing in Pediatrics

Course Evaluation | Help | Settings | Claim Credit | My Bookmarks

Introduction to the Project
Enter Baseline Data
Analyze Data and Identify Gaps
Review Selections

View Model for Improvement

Establish Baseline (Cycle 0)

Analyze Data and Identify Gaps

Analyze data with your team. Analysis is based on quality gaps (measures) in key clinical activities. Review the gaps (measures) your team selected for improvement and make changes as needed.

Download My Entered Chart Data

Identify Quality Gaps and Select for Improvement

Print

Selected for Improvement	Key Clinical Activity	Measure Analyzed	My Score	Goal	Quality Gap	Run Chart
☐	Vaccinate for Influenza	Recommend annual flu shot	90%	90%	-	
☐ X	Asthma Action Plan	Provide/review current Asthma Action Plan at every visit	NA	90%	90%	
☐	Education	Provide/explain education and self-management materials	100%	90%	-	
☐ X	Asthma Control and Follow up	Identify reasons for lack of asthma control	100%	90%	-	
☐	Asthma Control and Follow up	Establish current level of control using validated tool	0%	90%	90%	
☐	Asthma Control and Follow up	Follow-up	100%	90%	-	
☐	Spirometry	Obtain spirometry measurements every 1-2 years	100%	90%	-	
☐ X	Diagnosis	Establish diagnosis with spirometry for patients 5 and older	10%	90%	80%	
☐	Diagnosis	Consider asthma diagnosis when key indicators are present	100%	90%	-	
☐	Medications	Medication	90%	90%	-	

Save and Continue

Appendix E

Asthma: Diagnosing and Managing in Pediatrics

EQIPP
Helping You Improve Care for Children

Improvement Planning Worksheet

AIM

Describe the aim of this project. What are you trying to accomplish? Every aim will require multiple small tests of change.

IDEA

Describe the proposed test. What performance gap will it address? What idea will you test? What barriers will you need to overcome?

Performance gap	Idea for test	Barriers

MEASURES

What is the desired goal that will close the performance gap? Describe the specific measures that will determine a successful outcome for the test.

PLAN

Describe your plan for change. List the tasks and tools needed to perform the test. Predict what will happen when the test is carried out.

Tasks and Tools	Predicted Outcome
Who: What: When: Where: How: Tools:	

DO

Try your change with a few patients over a short period of time. Collect data that can be measured. Describe what happened when you ran the test.

STUDY

Did the change result in the desired improvement? Describe how the measured results compare to the predicted outcome.

ACT

Describe how you will modify the plan in the next test cycle based on "learnings" from this cycle. Or, describe a new idea to test to help you achieve your aim.

Appendix F

BOX 3–1. KEY INDICATORS FOR CONSIDERING A DIAGNOSIS OF ASTHMA

Consider a diagnosis of asthma and performing spirometry if any of these indicators is present.* These indicators are not diagnostic by themselves, but the presence of multiple key indicators increases the probability of a diagnosis of asthma. Spirometry is needed to establish a diagnosis of asthma.

- Wheezing—high-pitched whistling sounds when breathing out—especially in children. (Lack of wheezing and a normal chest examination do not exclude asthma.)
- History of any of the following:
  - — Cough, worse particularly at night
  - — Recurrent wheeze
  - — Recurrent difficulty in breathing
  - — Recurrent chest tightness
- Symptoms occur or worsen in the presence of:
  - — Exercise
  - — Viral infection
  - — Animals with fur or hair
  - — House-dust mites (in mattresses, pillows, upholstered furniture, carpets)
  - — Mold
  - — Smoke (tobacco, wood)
  - — Pollen
  - — Changes in weather
  - — Strong emotional expression (laughing or crying hard)
  - — Airborne chemicals or dusts
  - — Menstrual cycles
- Symptoms occur or worsen at night, awakening the patient.

Appendix G

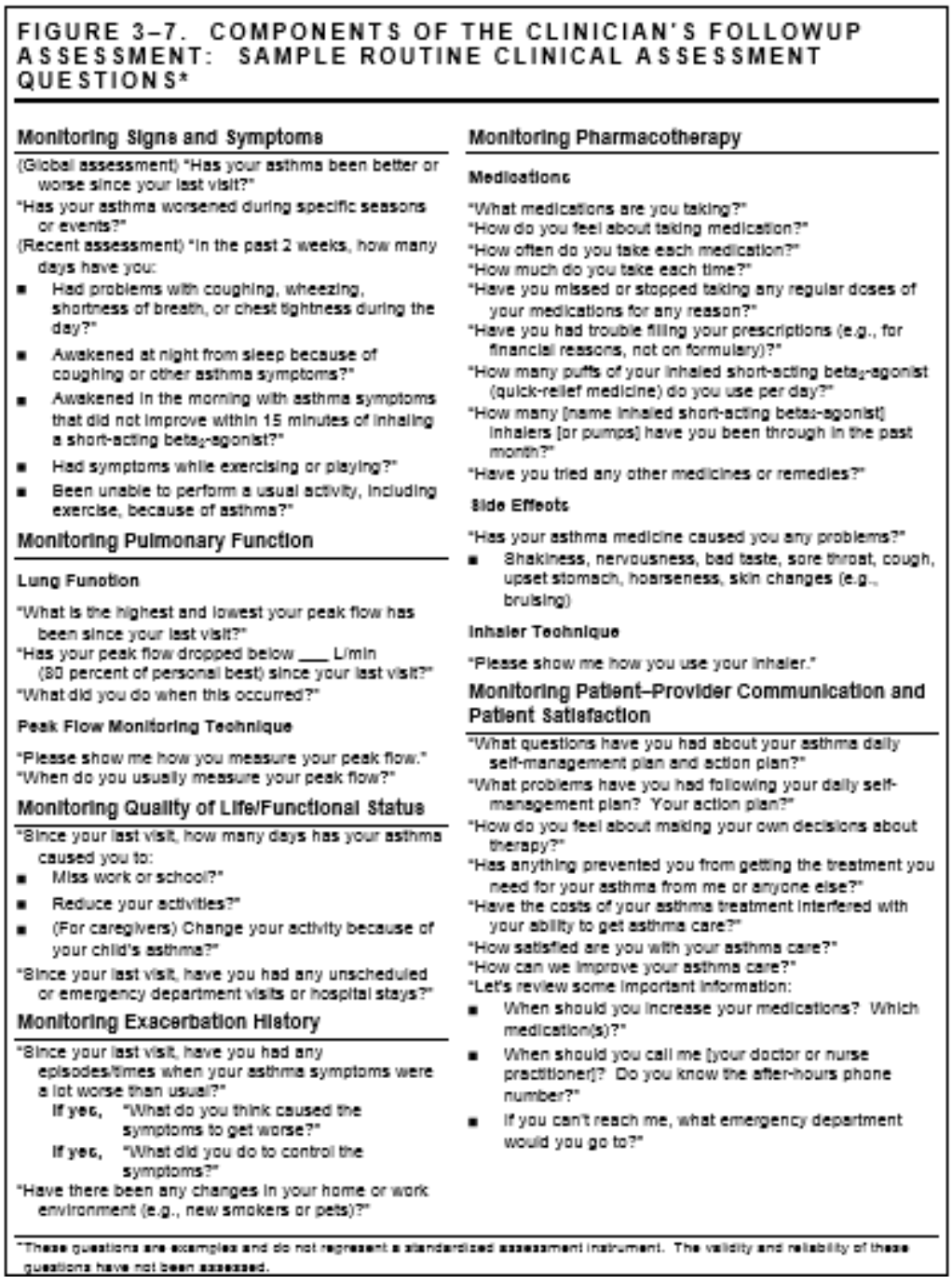


FIGURE 3–7. COMPONENTS OF THE CLINICIAN'S FOLLOWUP ASSESSMENT: SAMPLE ROUTINE CLINICAL ASSESSMENT QUESTIONS*

Monitoring Signs and Symptoms

(Global assessment) "Has your asthma been better or worse since your last visit?"

"Has your asthma worsened during specific seasons or events?"

(Recent assessment) "In the past 2 weeks, how many days have you:

- Had problems with coughing, wheezing, shortness of breath, or chest tightness during the day?"
- Awakened at night from sleep because of coughing or other asthma symptoms?"
- Awakened in the morning with asthma symptoms that did not improve within 15 minutes of inhaling a short-acting beta$_2$-agonist?"
- Had symptoms while exercising or playing?"
- Been unable to perform a usual activity, including exercise, because of asthma?"

Monitoring Pulmonary Function

Lung Function

"What is the highest and lowest your peak flow has been since your last visit?"

"Has your peak flow dropped below ___ L/min (80 percent of personal best) since your last visit?"

"What did you do when this occurred?"

Peak Flow Monitoring Technique

"Please show me how you measure your peak flow."

"When do you usually measure your peak flow?"

Monitoring Quality of Life/Functional Status

"Since your last visit, how many days has your asthma caused you to:

- Miss work or school?"
- Reduce your activities?"
- (For caregivers) Change your activity because of your child's asthma?"

"Since your last visit, have you had any unscheduled or emergency department visits or hospital stays?"

Monitoring Exacerbation History

"Since your last visit, have you had any episodes/times when your asthma symptoms were a lot worse than usual?"

If yes, "What do you think caused the symptoms to get worse?"

If yes, "What did you do to control the symptoms?"

"Have there been any changes in your home or work environment (e.g., new smokers or pets)?"

Monitoring Pharmacotherapy

Medications

"What medications are you taking?"

"How do you feel about taking medication?"

"How often do you take each medication?"

"How much do you take each time?"

"Have you missed or stopped taking any regular doses of your medications for any reason?"

"Have you had trouble filling your prescriptions (e.g., for financial reasons, not on formulary)?"

"How many puffs of your inhaled short-acting beta$_2$-agonist (quick-relief medicine) do you use per day?"

"How many [name inhaled short-acting beta$_2$-agonist] inhalers [or pumps] have you been through in the past month?"

"Have you tried any other medicines or remedies?"

Side Effects

"Has your asthma medicine caused you any problems?"

- Shakiness, nervousness, bad taste, sore throat, cough, upset stomach, hoarseness, skin changes (e.g., bruising)

Inhaler Technique

"Please show me how you use your inhaler."

Monitoring Patient–Provider Communication and Patient Satisfaction

"What questions have you had about your asthma daily self-management plan and action plan?"

"What problems have you had following your daily self-management plan? Your action plan?"

"How do you feel about making your own decisions about therapy?"

"Has anything prevented you from getting the treatment you need for your asthma from me or anyone else?"

"Have the costs of your asthma treatment interfered with your ability to get asthma care?"

"How satisfied are you with your asthma care?"

"How can we improve your asthma care?"

"Let's review some important information:

- When should you increase your medications? Which medication(s)?"
- When should you call me [your doctor or nurse practitioner]? Do you know the after-hours phone number?"
- If you can't reach me, what emergency department would you go to?"

*These questions are examples and do not represent a standardized assessment instrument. The validity and reliability of these questions have not been assessed.

Appendix H

FIGURE 3–9. SAMPLE PATIENT SELF-ASSESSMENT SHEET FOR FOLLOWUP VISITS*

Name: _____ **Date:** _____

Your Asthma Control

How many days in the past week have you had chest tightness, cough, shortness of breath, or wheezing (whistling in your chest)?	____ 0 ____ 1 ____ 2 ____ 3 ____ 4 ____ 5 ____ 6 ____ 7
How many nights in the past week have you had chest tightness, cough, shortness of breath, or wheezing (whistling in your chest)?	____ 0 ____ 1 ____ 2 ____ 3 ____ 4 ____ 5 ____ 6 ____ 7
Do you perform peak flow readings at home?	_____ yes _____ no
If yes, did you bring your peak flow chart?	_____ yes _____ no
How many days in the past week has asthma restricted your physical activity?	____ 0 ____ 1 ____ 2 ____ 3 ____ 4 ____ 5 ____ 6 ____ 7
Have you had any asthma attacks since your last visit?	_____ yes _____ no
Have you had any unscheduled visits to a doctor, including to the emergency department, since your last visit?	_____ yes _____ no
How well controlled is your asthma, in your opinion?	____very well controlled ____somewhat controlled ____not well controlled
	_____ Average number of puffs per day

Taking your medicine

What problems have you had taking your medicine or following your asthma action plan?

Please ask the doctor or nurse to review how you take your medicine.

Your questions

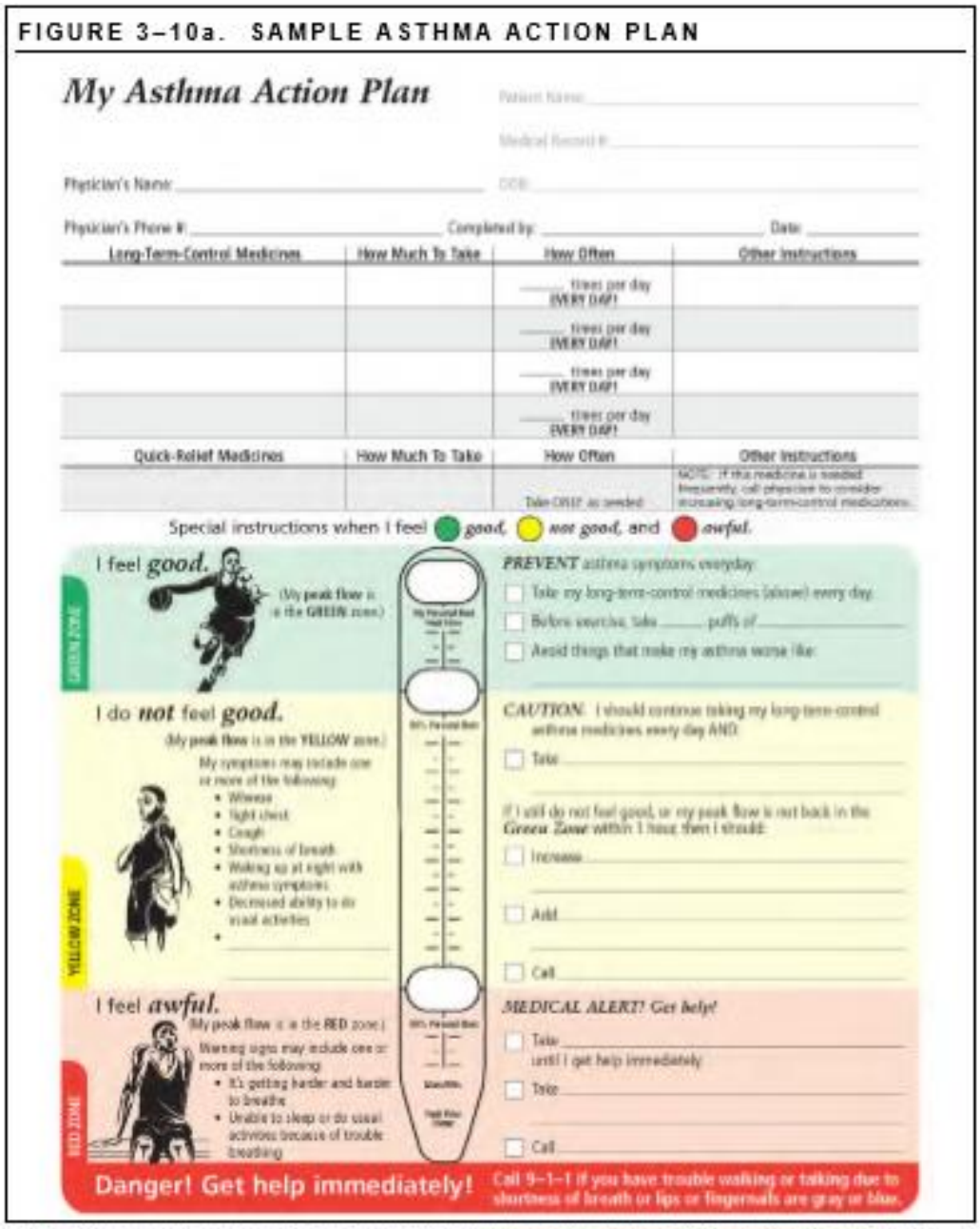
What questions or concerns would you like to discuss with the doctor?

How satisfied are you with your asthma care?	____very satisfied ____somewhat satisfied ____not satisfied

*These questions are examples and do not represent a standardized assessment instrument. Other examples of asthma control questions: Asthma Control Questionnaire (Juniper); Asthma Therapy Assessment Questionnaire (Volmer); Asthma Control Test (Nathan); Asthma Control Score (Boulet)

Appendix I

FIGURE 3–10a. SAMPLE ASTHMA ACTION PLAN



My Asthma Action Plan

Patient Name: _____

Medical Record #: _____

Physician's Name: _____ DOB: _____

Physician's Phone #: _____ Completed by: _____ Date: _____

Long-Term-Control Medicines	How Much To Take	How Often	Other Instructions
		____ times per day (EVERY DAY!)	
		____ times per day (EVERY DAY!)	
		____ times per day (EVERY DAY!)	
		____ times per day (EVERY DAY!)	

Quick-Relief Medicines	How Much To Take	How Often	Other Instructions
		Take ONLY as needed	NOTE: If this medicine is needed frequently, call physician to consider increasing long-term-control medications.

Special instructions when I feel good, not good, and awful.

GREEN ZONE

I feel *good.*

(My peak flow is in the GREEN zone.)

PREVENT asthma symptoms everyday:

- ☐ Take my long-term-control medicines (above) every day.
- ☐ Before exercise, take ____ puffs of _____
- ☐ Avoid things that make my asthma worse like: _____

YELLOW ZONE

I do *not* feel *good.*

(My peak flow is in the YELLOW zone.)

My symptoms may include one or more of the following:

- Wheeze
- Tight chest
- Cough
- Shortness of breath
- Waking up at night with asthma symptoms
- Decreased ability to do usual activities
- _____

CAUTION: I should continue taking my long-term-control asthma medicines every day AND:

- ☐ Take _____

If I still do not feel good, or my peak flow is not back in the *Green Zone* within 1 hour, then I should:

- ☐ Increase _____
- ☐ Add _____
- ☐ Call _____

RED ZONE

I feel *awful.*

(My peak flow is in the RED zone.)

Warning signs may include one or more of the following:

- It's getting harder and harder to breathe
- Unable to sleep or do usual activities because of trouble breathing

MEDICAL ALERT! Get help!

- ☐ Take _____ until I get help immediately
- ☐ Take _____
- ☐ Call _____

Danger! Get help immediately! Call 9–1–1 if you have trouble walking or talking due to shortness of breath or lips or fingernails are gray or blue.

Source: Adapted and reprinted with permission from the Regional Asthma Management and Prevention (RAMP) Initiative, a program of the Public Health Institute. http://www.calasthma.org/uploads/resources/actionplanpdf.pdf; San Francisco Bay Area Regional Asthma Management Plan. http://www.rampasthma.org

Appendix J

GANTT chart

	2015	**2015**	**2015**	**2016**	**2016**
TASK	Oct	Nov	Dec	Jan	Feb
AAP EDUCATION MODULE					
COLLECTION & ENTER BASE LINE DATA OF ASTHMA PATIENT					
ANALYZE THE DATA					
IDENTIFY THE GAP					
DEVELOP IMPROVEMENT PLAN					
IMPLEMENTATION PDSA CYCLE					
ANALYZE FOLLOWUP DATA					

Appendix K

Identify Quality Gaps and Select for Improvement

Selected for Improvement	Key Clinical Activity	Measure Analyzed	My Score	Goal	Quality Gap
	Vaccinate for Influenza	Recommend annual flu shot	90%	90%	-
	Asthma Action Plan	Provide/review current Asthma Action Plan at every visit	100%	90%	-
	Education	Provide/explain education and self-management materials	100%	90%	-
	Asthma Control and Follow up	Identify reasons for lack of asthma control	100%	90%	-
	Asthma Control and Follow up	Establish current level of control using validated tool	40%	90%	50%
	Asthma Control and Follow up	Follow-up	100%	90%	-
	Spirometry	Obtain spirometry measurements every 1-2 years	100%	90%	-
	Diagnosis	Establish diagnosis with spirometry for patients 5 and older	100%	90%	-
	Diagnosis	Consider asthma diagnosis when key indicators are present	100%	90%	-
	Medications	Medication	100%	90%	-

Appendix L

Evidence Table

Reference/ year	**Focus of study**	**Methods**	**Results/Level of evidence**
1). William S. Pearson, Scott A. Goates, Samantha D. Harrykisson, Scott A. Miller,2014	State-Based Medicaid Costs for Pediatric Asthma Emergency Department Visits	A cross-sectional design across multiple data sets to produce state-based cost estimates for asthma-related ED visits among children younger than 18, where Medicaid/CHIP (Children's Health Insurance Program) was the primary	There were approximately 629,000 ED visits for pediatric asthma for Medicaid/CHIP enrollees, which cost $272 million in 2010. The average cost per visit was $433. Costs ranged from $282,000 in Alaska to more than $25 million in California.
			Level of evidence- III
2). Betsy Sleath, Delesha M. Carpenter, Guadalupe X. Ayala, Dennis Williams, Stephanie Davis, Gail Tudor, Karin Yeatts, and Chris Gillette. 2011	Provider Discussion, Education, and Question-Asking about Control Medications during Pediatric Asthma Visits	Providers were recruited at five pediatric practices in nonurban areas of North Carolina, and consent was obtained. Children and their caregivers of these participating providers were recruited. All of the medical visit audio-tapes were transcribed verbatim, and a detailed coding tool was developed to assess provider communication behaviors.	Providers discussed the frequency of use, supply of medication, and strength/dose of medication with families most often, but they only discussed the purpose of the control medication during about one third of all visits and how well the medication works during about a quarter of all visits. Providers rarely discussed side eff ects and fears/concerns about control medications.
			Level of evidence- III
3). Kevin J. Dombkowski, Fauziya Hassan, Elizabeth A. Wasilevich, and Sarah J. Clark, 2010	Spirometry Use among Pediatric Primary Care Physicians	A mail survey of office based general pediatricians and family physicians, focusing on knowledge, attitudes, and practices regarding and perceived barriers to the use of spirometry.	Overall, 52% of respondents indicated that they used spirometry in clinical practice, and use was more common among family physicians than among

			pediatricians (75%vs35%).
			Level of evidence-I V
4). James R. Roberts, Catherine J. Karr, Lisa de Ybarrondo, Leyla E. McCurdy, Katherine D. Freeland, Thomas C. Hulsey, and Joel Forman, 2013	Improving Pediatrician knowledge about Environmental Triggers of Asthma.	After delivering a structured and standardized presentation on ET identification and control to pediatricians, we surveyed them about knowledge and practices of ET assessment and management. We analyzed matched responses for pre/post and 3- to 6-month follow-up using McNemar's $\chi 2$ test.	There was a significant post training increase in intention to ask about ETs and recommend ET management. After 3 to 6 months, all responses remained significantly higher than baseline, except "likely to refer to an asthma specialist."
			Level of Evidence- IB
5). Gerald B. Lee, and Tao T. Le, MD,2013	Knowledge, skills, and attitudes among pediatricians influence adherence to the asthma guidelines	Workshop-based provider education interventions	Both workshop- and technology-based interventions have the potential to improve knowledge and patient outcomes, but demonstration of long-term efficacy is challenging.
			Level of evidence -I B
6). Blenkhorn, P. J., Evans, G., Partridge, M. R.,& Roberts, N. J., 2010	Development of an electronic pictorial asthma action plan and its use in primary care.	A pictorial action plan was incorporated into a software package. 21 general practices were offered this tool and the software was loaded onto 63 desktop computers (46 GPs and 17 nurses). Usage was assessed and health care professionals questioned as to its use.	The individual usage rate ranged from 0 to 28 plans. Doctors printed 73% (139/190) a mean of 3 per doctor and nurses printed 27% a mean of 2 per nurse (37/190). Excluding the test copies, 116/173(67%) were printed as picture and text together.
			Level of evidence- II A

7). Lindsay Kuhn, Kelly Reeves, Yhenneko Taylor, Hazel Tapp, Andrew McWilliams, Andrew Gunter, M, Jeffrey Cleveland, and Michael Dulin, 2015	Planning for Action: The Impact of an Asthma Action Plan Decision Support Tool Integrated into an Electronic Health Record (EHR) at a Large Health Care System.	eAAP development occurred in 4 phases: web-based prototype creation, multidisciplinary team engagement, pilot, and system-wide dissemination. Medical record and hospital billing data compared frequencies of asthma exacerbations before and after eAAP receipt with matched controls.	This study supports existing evidence that patient self-management plays an important role in reducing asthma exacerbations. In addition, study also highlighted feasibility of leveraging technology to provide guideline-based decision support through an eAAP, addressing known challenges of implementation into routine practice.
			Level of evidence- I B
8). National Asthma Education and Prevention Program Expert Panel Report 3	Guidelines for the Diagnosis and Management of Asthma.	Using the 1997 EPR—2 guidelines and the 2002 update on selected topics as the framework, the expert panel organized the literature review and updated recommendations for managing asthma long term and for managing exacerbations around four essential components of asthma care, namely: assessment and monitoring, patient education, control of factors contributing to asthma severity, and pharmacologic treatment. Subtopics were developed for each of these four broad categories.	The broad change in clinical practice depends on the influence of local primary care physicians and other health professionals who not only provide state-of-the-art care to their patients, but also communicate to their peers the importance of doing the same. The NHLBI and its partners will forge new initiatives based on these guidelines to stimulate adoption of the recommendations at all levels, but particularly with primary care clinicians at the community level.
			Level of Evidence-I V

Appendix M

Review of Literature

Gaps Identified

- Lack of diagnostic measures, assessment & monitoring.
- Less than optimal pharmacologic therapy.
- Lack of control of environmental factors contributing to asthma severity.
- Reduced patient/care giver education in asthma care.
- No Asthma Action Plan.

Challenges to adhere to asthma guidelines

Patient

- Concern over cost required for change.
- Lack of motivation
- Time constraints

Provider

- Lack of familiarity and awareness of guidelines
- Difficulty with asthma severity classification
- Low outcome expectancy for successful behavior change in patients
- Lack of time to educate patients

Payer

- Poor reimbursement
- Increased practice cost
- Liability

Appendix N

Budget Details

Vitalograph micro spirometer	$990
Asthma plan and peak flow meter for patient	$400
Course registration fee for student at EQIPP site	$200
Cost of the stationaries &	$100
Total Cost	$ 1690

Appendix O

10/14/15

TO WHOMSOEVER IT MAY CONCERN

This is to inform that I Dr. Neela Parekh, has given permission to Ms. Sosamma Ashley, DNP student of University of Sanfrancisco, to conduct her project on Asthma at my Pediatric Clinic at Los Gatos, CA.

Thank you,

N. Parekh. MD.

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